Consulting Engineer

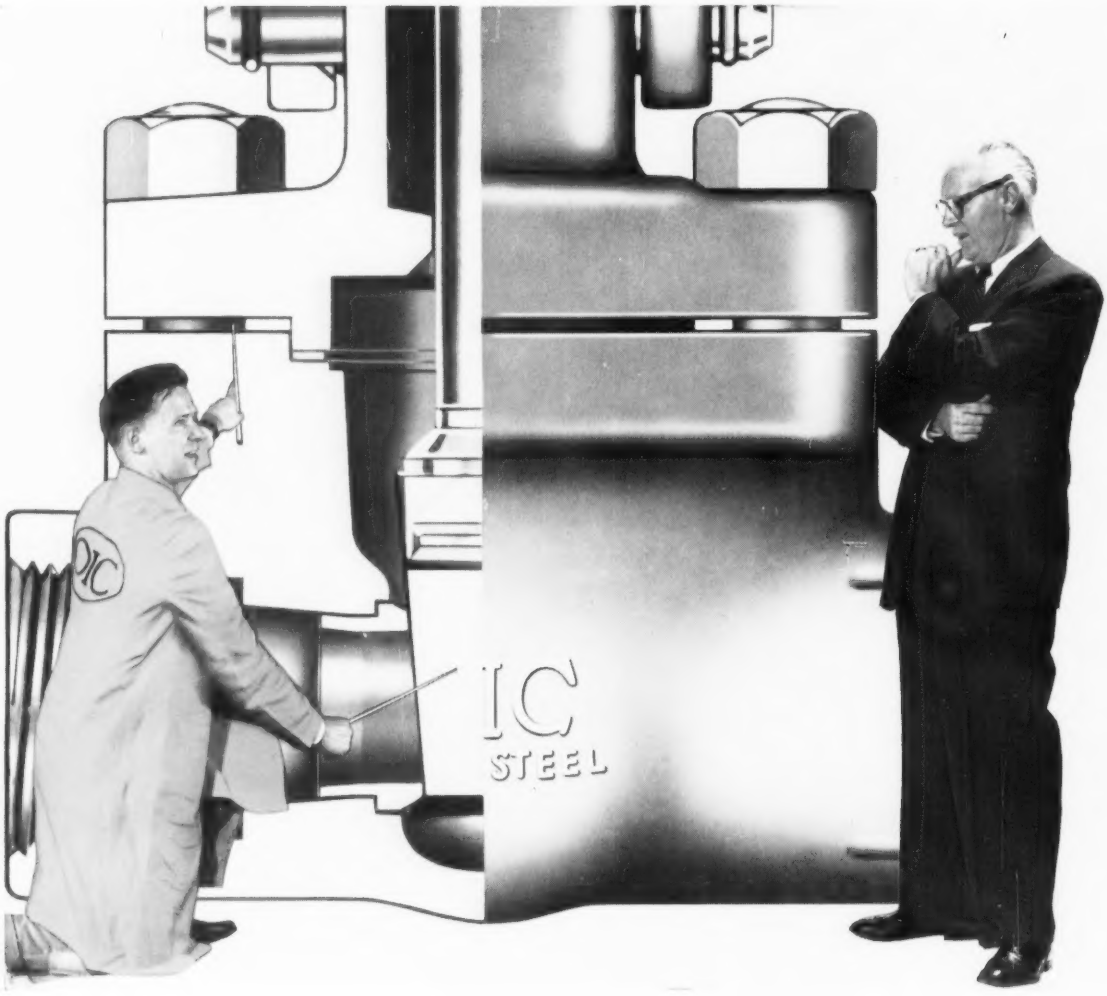
February 1959

Photo by Fabian Bachrach

JOHN B. MCGAUGHY, partner and chief engineer of Lublin, McGaughy & Associates, Norfolk, Virginia, architect-engineers, has spent the past five years and a great deal of money fighting to have consulting engineer firms exempt from the Fair Labor Standards Act. His case went before the U.S. Supreme Court last October, and a decision was handed down on January 12. McGaughy lost. The majority opinion was written by Chief Justice Warren, and it stated

Continued on page 8

...and you can see here....and here, sir, how we've killed maintenance problems on our new forged steel lines.



We stop galling and erosion by giving you 13% chrome stainless steel trim with wedges *duracased* to a rugged *1000 Brinell hardness*.

The square and *bolted* body-bonnet joint makes it easy to service the valve quicker. And it's a tighter joint, made doubly leakproof by recessing the soft iron gasket into the body. The gasket can't blow!

And you get the fastest joint make-up you've ever seen. Look at those pipe ends. See the extra wrench-gripping area and lugs. See how body-bonnet flanges are out of the wrench's way. No time lost here!

These new 600-lb. OIC forged steel valves are available with either *high-flow* ports (1300 line), or *standard-flow* ports (1100 line). Call your OIC Distributor, or write for specification literature.

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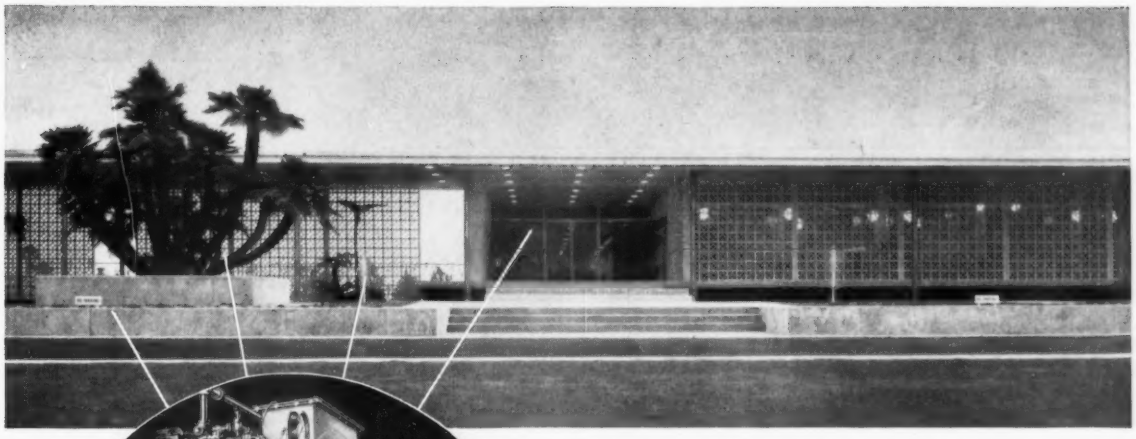
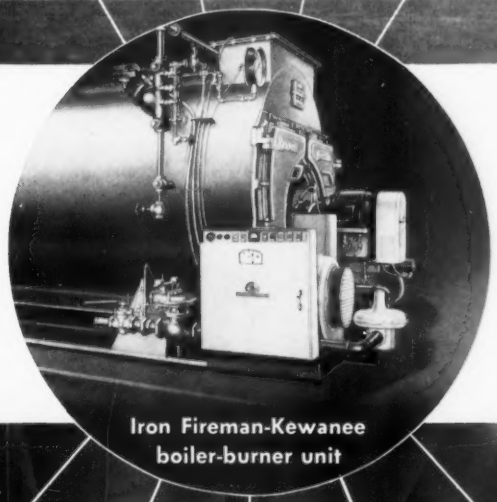
RESEARCH AND DEVELOPMENT SECTION



Screened facade of Stuart Co. plant, Pasadena, California



Iron Fireman-Kewanee boiler-burner unit

Where the *steam* comes from...

for both heating and pharmaceutical processing

One of the notable commercial buildings of the year combines maximum utility with such striking beauty that it has won nation-wide acclaim. Designed by Edward D. Stone, this plant is used by the Stuart Co. for the production of pharmaceuticals.

Up-to-the-minute mechanical equipment includes two Iron Fireman-Kewanee boiler-burner units. Due to forced draft firing, there is no stack to mar the symmetry of the building. Dual-fuel burners efficiently fire gas or any grade of light or heavy oil, with quick changeover.

Complete Iron Fireman boiler-burner units can be easily sized, specified and ordered from a single catalog, with a single model number.

Conservative rating permits an easy, economical "cruising speed" at rated output, with 50% reserve capacity and consequent minimum noise level and low maintenance costs.

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Lounge and offices overlook spacious atrium

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Mechanical Contractors: Hickman Bros., Inc.

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...of an intensive program of chemical research and engineering development carried on by Graver Water Conditioning Co. with a twofold purpose:

- to advance the art and science of liquid treatment
- to solve practical problems as they arise on individual jobs

Graver has made, and continues to make, studies of all aspects of equipment design, operating results and process techniques with the view to improving existing methods and developing new ones for the treatment of all types of liquids.

As new achievements are realized through this constant search, they are given practical form and made available for the benefit of the fields served by Graver: *power plant utilities, industrial and municipal water treatment, industrial waste treatment and chemical processing.* The products shown on this page are but a few of the recent developments from Graver's expanding facilities, now the largest in the liquid treatment industry.

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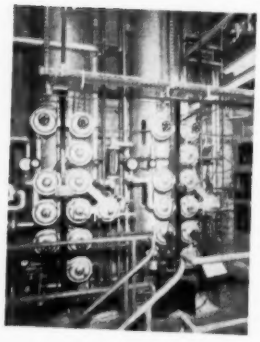

REPORT NO: 197

Condensate Scavengers-for power plant utilities. Equipment for internal self-purification of condensate in sub-critical as well as supercritical boiler cycles.

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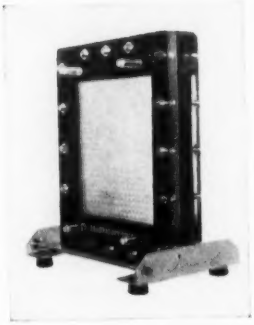

REPORT NO: 204

Dialysis Systems and Laboratory Units—for chemical processing and industrial waste treatment. Systems for separation of acid, alkali, neutral salt liquors.

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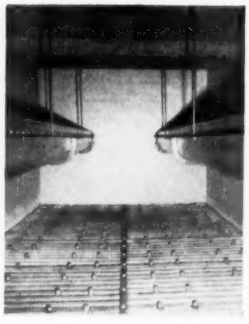

REPORT NO: 193

Non-Corrosive Underdrain — for municipal water treatment. New underdrain for gravity filters weighs much less than other designs and improves backwashing.

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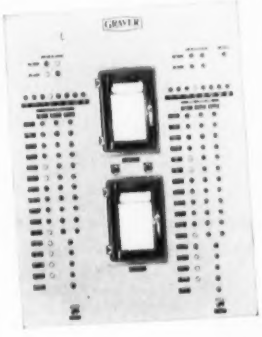

REPORT NO: 187

Monitoring Systems — for all fields. Systems to check and report malfunction in the operation of demineralization plants, especially of the automatic type.

Consulting Engineer ®

The Consulting Engineer's Professional Magazine

Wayne near Pleasant Street
Saint Joseph, Michigan

February 1959 • VOLUME XII • NUMBER II

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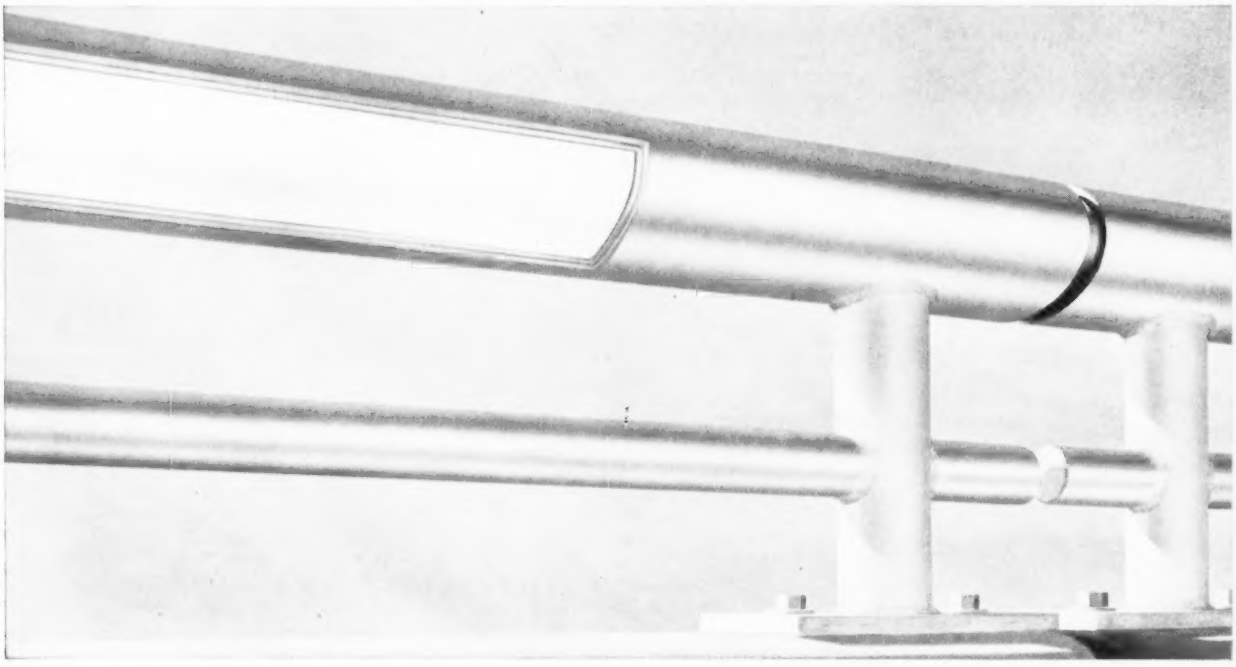
BPA

Manahawkin, N.J., Bay Bridge—New Jersey State Highway Department. General Contractor: Conduit and Foundations, Philadelphia, Pa. Steel and Railing erected by Cornell & Co., Inc., Woodbury, N.J. Lighting: General Electric. Photographs: Cortland V. D. Hubbard.

2400 FEET OF BRIDGE . . . 4800



To provide for luminaire lighting, the engineers of Manahawkin, N. J., Bay Bridge—in conjunction with General Electric—worked out the special design for the bridge railing shown above.

And Michael Flynn—in strict accordance with specifications—supplied the extruded aluminum railings, posts, and base plates. Later these were welded into easily manageable units which could be handled and installed with minimum labor.

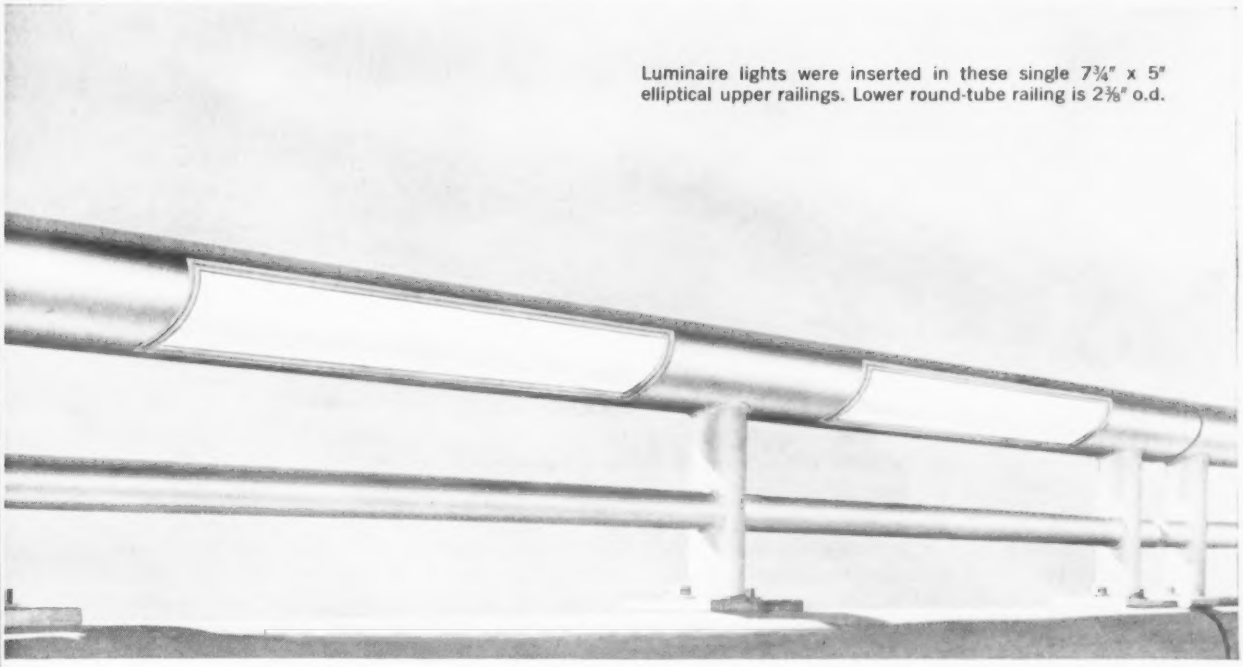
The ability to turn out material for special designs is one advantage Flynn offers you. For many jobs, however, where post and rail jobs are desired, you can save money by choosing from Flynn's great variety of functional, attractive *standard* designs.

Also you can depend on Flynn to deliver aluminum railing and components direct to the job site, ready for fast, easy installation . . . on time, in the quantities specified.

What's more, no overmanned crews, no lift trucks, no cranes are needed on Flynn installations. Two men, with wrenches as their principal tools, can install the lightweight Flynn bridge railings shown here. (With other Flynn railings, one man can often do the job alone.)

And because Flynn bridge railing is non-rusting aluminum, it never needs painting. It's so tough and durable, nothing short of an accident can make replacement necessary.

FEET OF FLYNN BRIDGE RAILING



Luminaire lights were inserted in these single 7¾" x 5" elliptical upper railings. Lower round-tube railing is 2⅜" o.d.

For help in your own projects, send for a free copy of Flynn's new bridge railing catalog. Write on your own letterhead to Michael Flynn Manufacturing Company's main office.

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John B. McGaughy

– Starts on front cover

that McGaughy's draftsmen, fieldmen, clerks, and stenographers are engaged in interstate commerce because they work on interstate projects such as roads, terminals, and broadcasting stations. The Court based its decision upon the activity of the employees rather than upon the nature of the employer's business. This means, generally speaking, that nonprofessional employees of consulting offices *do* come under the Wage and Hour Law. There is no appeal beyond this high court. Any relief must come through amendment of the Fair Labor Standards Act – an unlikely possibility.

McGaughy's troubles began five years ago when Federal investigators checked his books and informed him that he was "basically in violation" of the Wage and Hour provisions of the Act. The government contended that Lublin, McGaughy & Associates was engaged in interstate commerce because its employees travel across state lines. Specifically, the point at issue involved a party of surveyors which, as a matter of convenience, reported to McGaughy's Washington office daily on their way to a project in Maryland. To further back up its argument the government pointed out that blueprints were shipped regularly from the Virginia to the District of Columbia offices.

"We could have paid then, and it would have involved only a matter of $2000 to $3000 a year," McGaughy said. "But once you go under the Wage-Hour rules, you stay there."

Complying with the Wage-Hour laws would have affected only some 50 surveyors, draftsmen, and secretaries but it would have meant converting the entire payroll from a semimonthly to a weekly basis –additional bookkeeping expense and trouble.

In the past, McGaughy paid his hourly employees at regular rates–nothing extra–for overtime work. The Court now insists that McGaughy's employees must be paid time and one half for overtime. He objects, again not because of the money, but the principle. McGaughy says, "A young engineer should be an aspiring professional, but you would be surprised at the difference time and a half makes in a young man's basic attitude. Most of them would rather have the overtime pay than work on a salary and bonus basis. They are afraid that on salary they might have to work an hour or two overtime. This is a step toward unionism."

The survey parties, the original cause of the argument, were paid for 10 hours, but expected to work only eight. The extra hours were to cover their travel time. "But with the wage-hour program in effect, I will pay only for hours worked, and let the men worry about their own travel time from home," McGaughy added.

How did Lublin, McGaughy & Associates receive the dubious honor of being chosen by the government as a test case?

Government field men said none of McGaughy's men complained of being overworked or underpaid. The firm was selected at random. Other firms have been told by government field workers that they are "basically in violation" of the law. Not all of these consulting engineers have admitted the charges and a number of cases were being held up pending the Supreme Court decision. Singstad & Baillie of New York City, for example, has a suit pending in Maryland.

The National Society of Professional Engineers took an early interest in McGaughy's case and filed a brief as friend of the court, and the Consulting Engineers Functional Section is contributing $2500 to McGaughy's legal expenses. This will cover the lawyers' fees, but not the total costs. McGaughy estimates the lost time cost him a minimum of $3000 with attorney fees an additional $9000 to $10,000 even before the Supreme Court hearings.

"At least it's deductible," McGaughy said.

International Operation

Now a partner in a firm of approximately 200 employees with domestic offices in Norfolk and Washington, D.C. and foreign offices in France, Italy, and Hawaii, McGaughy began private practice in 1945, "without a client in sight." Little more than a year later, McGaughy joined forces with an architect, Alfred M. Lublin. Today the firm consists of four partners, and it annually handles projects representing a value of $40 million.

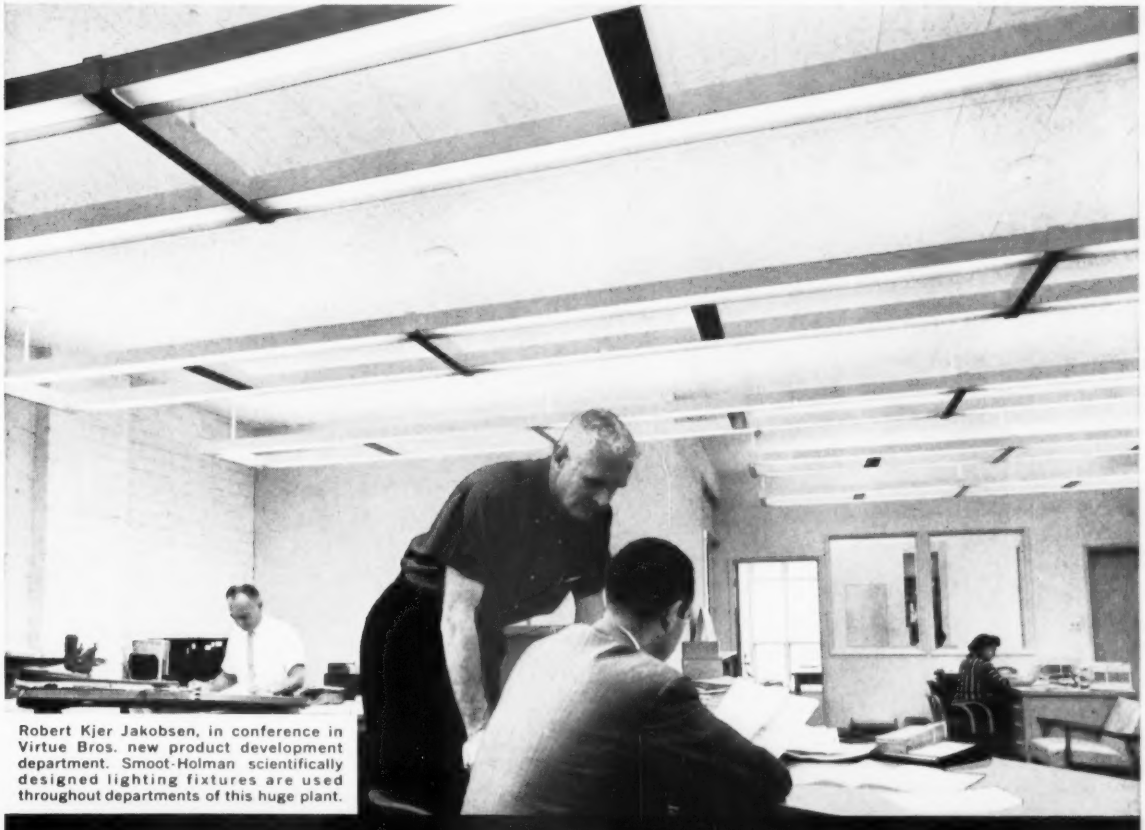
McGaughy strongly advocates the engineer-architect combination. "The concept of a modern building is different from what it was a few years ago. Once, the emphasis was on architectural and structural engineering. Today, the mechanical and electrical engineering is the most troublesome and sometimes most complicated part of a design. Our firm specializes in doing what people want done."

A look at the firm's brochure bears this out. Lublin, McGaughy & Associates' list of services provided includes architecture; civil, structural, mechanical, electrical, sanitary, and highway engineering; surveys and topography; test borings; cost analysis; quantity analysis; technical research; economic studies; mapping; industrial studies; supervision of construction; project inspection; and even a recent operational manual for the Seabees.

McGaughy says the most important work of his firm is coordination of engineering and architecture. "We can standardize many things. Lettering, line weights, and order of plans always is the same.

Virtue BROTHERS OF CALIFORNIA

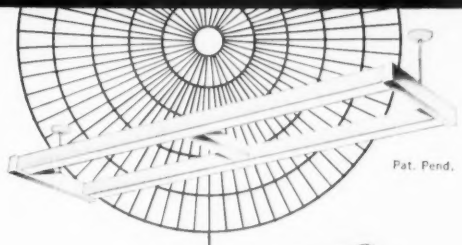
world's largest manufacturer of metal dining furniture, chooses Smoot-Holman lighting fixtures for true scientific lighting!



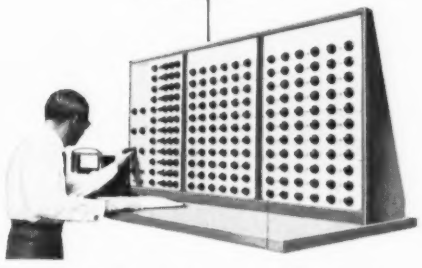
Robert Kjer Jakobsen, in conference in Virtue Bros. new product development department. Smoot-Holman scientifically designed lighting fixtures are used throughout departments of this huge plant.

scientifically designed **SMOOT-HOLMAN** lighting brings you

"TOMORROW'S LIGHTING TODAY"



Pat. Pend.



Smoot-Holman's advance design analogue computer. Used to achieve superior lighting design and unsurpassed lighting performance!

Robert Kjer Jakobsen, Chief Designer at Virtue Bros. Mfg. Co., has this to say about SMOOT-HOLMAN Lighting: "We're using Smoot-Holman Perfect Vision Luminaires in many areas in our office and plant because we feel they provide excellent light with no glare or sharp shadows. Before deciding on Smoot-Holman lighting fixtures we made a survey of a number of lighting installations and came to the conclusion that the Perfect Vision unit was the ideal one from many angles.

"In making our decision we took into consideration a number of things. Of first importance was to get a good lighting job ... which the Perfect Vision Luminaires give. Other important advantages we found in the Perfect Vision Fixture were ease of installation and maintenance. With maintenance labor costs what they are, we have to consider not only the initial cost of fixtures but maintenance as well. We have found that the Smoot-Holman Perfect Vision Fixture meets all our requirements perfectly."

SMOOT-HOLMAN CO.

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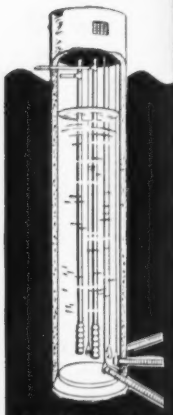
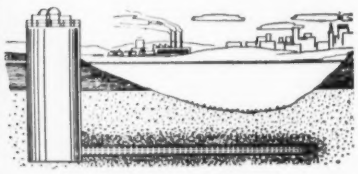


CONVENTIONAL COLLECTOR



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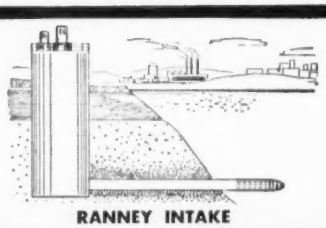
RANNEY VERTUBE



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RANNEY VERTUBE. A natural gravel vertical water well at low cost, developed exclusively for low volume users. Engineered with the same precision and efficiency that has made Ranney a *must* for communities.

THE RANNEY INTAKE designed to provide surface water efficiently and economically. These structures can usually fit into the design of your engineering department or consultant.

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As a result, we can overlay architectural and engineering drawings on a light table and immediately spot conflicts."

McGaughy says his firm has no worries about the quality of any architectural or engineering work. "For instance, an independent architect gets a commission, and he goes to a consulting engineer he has worked with before. But he does not know what that engineer's current work load is or what priority the project will be given. Even worse, if the architect has to go to an engineer he has not worked with before, he does not know the quality of the work he will get. After all, there are good and poor consulting engineers, as there are good and poor practitioners in all professions."

The time saved in a combined architect-engineer firm is another important factor, McGaughy said. "If our engineer has a problem, he does not have to wait until a meeting at 4 p.m. tomorrow to discuss it with the architect."

Firm Organization

McGaughy's firm is well organized. For each job, a captain is named coordinator. "We usually appoint an architect or a civil engineer for this, for mechanical and electrical engineers tend to have a more specialized concept of the over-all project."

Progress charts are kept for each project and posted on the bulletin boards of all departments involved. These charts have three curves: one curve represents the planned program of the job in time and money; the second curve represents the actual amount spent on the job at the end of each pay period; the third curve represents the percentage of completion.

These progress charts have a number of functions. They give everyone a sense of identity with the project. If progress is slow, even the draftsmen know it is to their benefit to increase production —and the company pays substantial bonuses on a basis of accomplishment. The charts also have done away with the $5-an-hour man doing a $2-an-hour job. This would show up shortly on the dollar curve. "Engineers tend to try to do everything. We discourage this. We want engineers to do engineering. We have expert accountants to do the bookkeeping, and draftsmen to make the detailed drawings."

This anti-do-it-yourself theory extends to top management. McGaughy said his firm keeps excellent attorneys on a retainer basis. No one at Lublin, McGaughy makes a snap decision on even a minor legal matter. "We stick to the fields in which we are expert."

Diplomacy, Not Politics

The Lublin, McGaughy firm specializes in diplomacy, but avoids politics. Most work in the Wash-

CITY OF MANITOWOC INSTALLS SIXTH WICKES BOILER

R. E. Connard—Chief Engineer and General Manager

Manitowoc Public Utilities Commission has just installed the sixth Wickes Steam Generator to help provide power for the City of Manitowoc, Wisconsin, and its surrounding area. The continued selection of Wickes equipment by this progressive municipality is a tribute to the dependability and quality of Wickes Steam Generators.

Wickes Boiler Co. builds steam generators for all branches of industry . . . for municipalities and for private and public buildings. Wickes units are available in sizes up to 500,000 lbs. of steam per hour and are designed for high or low steam pressures and temperatures, and for all types of fuels and firing methods. There is a Wickes design available for your needs.

Write for bulletin 55-1, showing the wide variety of designs and sizes available in both field-erected and shop-assembled* steam generators, or ask the nearest Wickes representative to call on you for full information.

*For the latest developments in shop-assembled boilers, investigate Wickes natural circulation A-type water tube units now built for capacities up to 75,000 lbs. per hour for oil and gas fuels. Request bulletins 56-1 and 57-1 for full information.

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Concrete Filled columns, widely used in contemporary building featuring versatility and beauty, adds strength—prevents corrosion. Shown below—round, square and rectangular concrete filled columns are used on a construction project providing elements in safety, beauty, strength and economy. Specify Tubular Products columns on your job. For more information, write Tubular Products, Souderton, Pennsylvania.

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Products, Inc.
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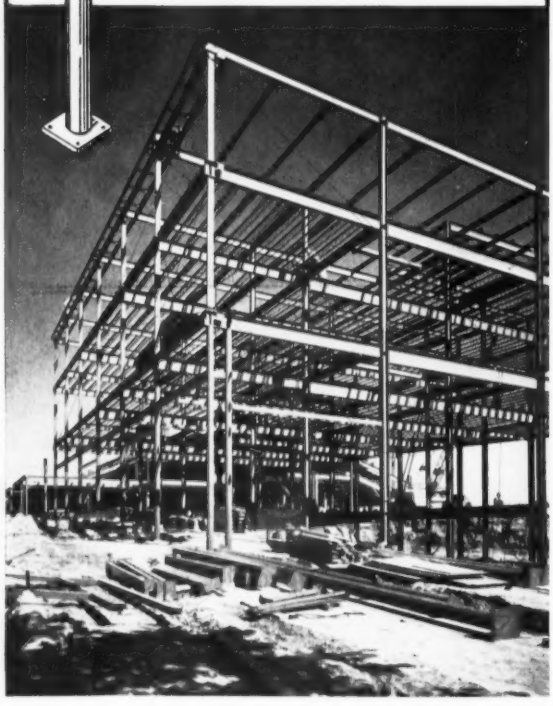


ington office is with government agencies. "But we do our contact work on a working level, thus avoiding politics." Although his firm loses many of the larger projects (politics tend to play a part in the big jobs), McGaughy thinks the "apolitical" attitude pays off over the years.

On foreign work, however, an engineer's diplomacy can make the difference between a successful project and a stalemate. "Military people have rigid rules. On a project that involves, say, the U.S. Corps of Engineers and the French Corps of Engineers, both have rulebooks setting out rigid standards that must be followed. But these standards differ. If left to the military this could lead to an argument that would be extremely difficult to resolve because of the language barrier and local customs," McGaughy said.

With its many foreign offices, Lublin, McGaughy always has engineers and architects who speak the language of the country they are working in. Frequently they have been based in the country for years, and know the temperament of the people. Lublin, one of the other partners in the firm, was born in Germany and speaks fluent French, German, English, and Italian.

So Lublin, McGaughy personnel frequently act as mediators and work out solutions to rulebook conflicts that leave both sides satisfied. "We've taken over projects where other firms have been unsuccessful because of this one diplomatic fault," McGaughy added.

Foreign Offices

The Lublin, McGaughy offices outside of the continental United States are not set up haphazardly. Little more than a year ago an office was established in Honolulu. At the time, not a client was in view. Because the site had been studied for a number of years, Lublin, McGaughy thought an office in the western Pacific would be a sound investment. Already the office is paying its own way, and is expected to show a profit on its operations within another year.

McGaughy said many firms claim to have offices scattered all over the world when all they have is a mailing address with a local engineer in each country. "We do not condemn this practice, nor do we engage in it. Our foreign offices are sound establishments, not field offices here today and gone tomorrow. The offices are headed by men capable of making decisions. And we back up those decisions all the way."

Education and Experience

Following his graduation from Duke University, McGaughy's first job was with the government. Between 1935 and 1943, he advanced to Chief of

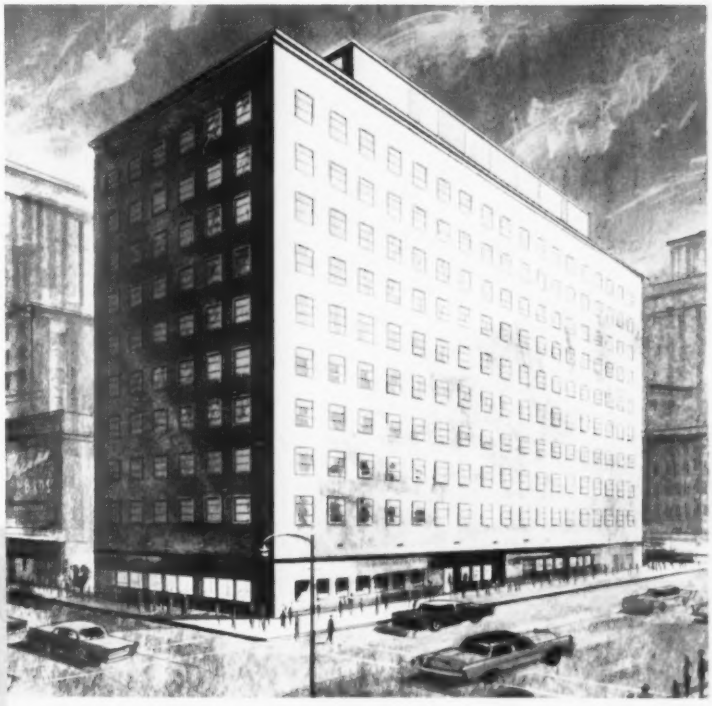
"Low cost **OASIS IN-A-WALLS** the complete solution to cooled water"

Ultra-modern new Howard Building in Providence, R. I., has built-in Oasis In-A-Wall Water Coolers. Architect—Albert Harkness & Peter Geddes, Providence.

The Howard Realty Company, of Providence, R. I., is unusually enthusiastic over the super-compact efficiency of the Oasis In-A-Wall Water Coolers in its new 10-story Howard Building. The owner says,

"We're greatly pleased with the low cost, the ease of installation, and the clean-cut modern look of our ten Oasis In-A-Wall Water Coolers. Everyone concerned feels that they are the complete solution to our problem of providing ample cooled water for each floor."

Versatile Oasis In-A-Wall Water Coolers are easy to mount on joists, in closets, or on a wall. They're built thin to build in —even in an 8-inch wall. In-A-Wall coolers can serve up to four remote fountains with cool, refreshing water.



Specify either of two models. IW-5 supplies 5 GPH for two remote fountains, serves 60 in offices, 35 in light industry. IW-10 has 10 GPH capacity for four remote fountains, serves 120 people in offices, 70 in light industry.

For every building need, there's an Oasis Water Cooler. Line includes models with capacities from 2 to 35 GPH, some with refrigerated compartments, and the famous Hot 'n Cold which also supplies piping hot water for coffee-breaks.

Send the coupon for complete specifications and roughing-in details prepared especially for Consulting Engineers.

OASIS WATER COOLERS

The Ebco Manufacturing Company, Columbus 13, Ohio
Manufacturers of the most complete line of water coolers
Distributed in Canada by G. H. Wood & Co., Ltd.

THE EBCO MANUFACTURING COMPANY
Dept. 4-L, Columbus 13, Ohio

Send specifications and roughing in details for Oasis Water Coolers including the new In A Wall models.

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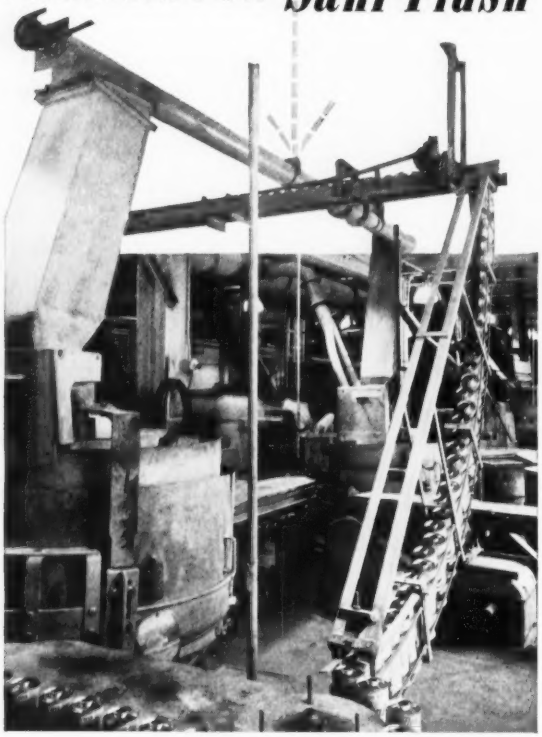
company _____

address _____

city _____ **zone** ___ **state** _____

CANTON *Flo-tube*
SOLVES MATERIAL HANDLING
PROBLEM FOR *Sani-Flush*



SCREW CONVEYOR SAVES 88%
ON CAPITAL INVESTMENT

Boyle-Midway, Inc. uses Flo-tube to move sodium bisulfate at will to an additional packaging machine for filling new 35 oz. economy-size Sani-Flush at an 88% saving in capital investment for proportioning and blending equipment.

Flo-tubes **move or feed** chemicals, coal, gravel, salt, sand, sawdust, sugar, woodchips and other bulk materials. They **maintain** predetermined delivery rates. They **save time** . . . up to 95% on general applications. They **save space**. Power source is optional. Flo-tubes exclusive Synchro-gear-drive motor is 98% **efficient.**

For complete information about Flo-tubes versatility in feeding bulk materials dependably, cleanly and economically . . . write today.

1907 50th 1957 CANTON STOKERS

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the Design Section, U.S. Engineers Office, Norfolk, in charge of all military construction design, handling projects valued at $50 million annually. McGaughy frequently did design, drafting, and field work on the same project, and now believes in rounded experience for all engineers on his staff. Every engineer in the Lublin, McGaughy firm (except McGaughy) has his own drafting board for initial design. "And I frequently borrow a drafting board."

Organization Work

McGaughy is active in a number of engineering organizations. In NSPE he is a national vice president, has been a member of the Board since 1951, and is chairman of the public relations committee. He is a past president of the Virginia Society of Professional Engineers and the Engineers Club of Hampton Roads. He is a member of the American Society of Civil Engineers, Society of American Military Engineers, and the American Concrete Institute.

McGaughy says he sees no need for the Consulting Engineers Council, and although he was chairman of the NSPE committee that created the functional sections, he is not convinced that NSPE Consulting Engineers Functional Sections will ever be needed in many states. He admits that such groups might do some good in public relations and in working on legislation that affects only consulting engineers. "We could channel certain matters through the Functional Section, rather than have the consultants' legislation handled by the overall NSPE, in which the engineers in private practice are a small minority," he added.

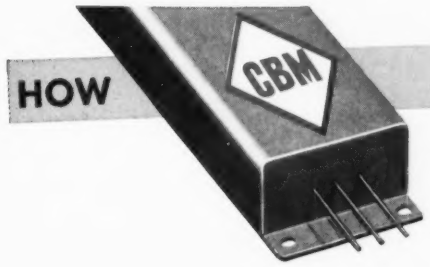
Problems of Private Practice

What is the biggest problem facing the engineer in private practice?

McGaughy said he does not want to teach prospective clients "what is a consulting engineer." Rather he wants to get clients to ask "who is *this* consulting engineer" when faced with a problem.

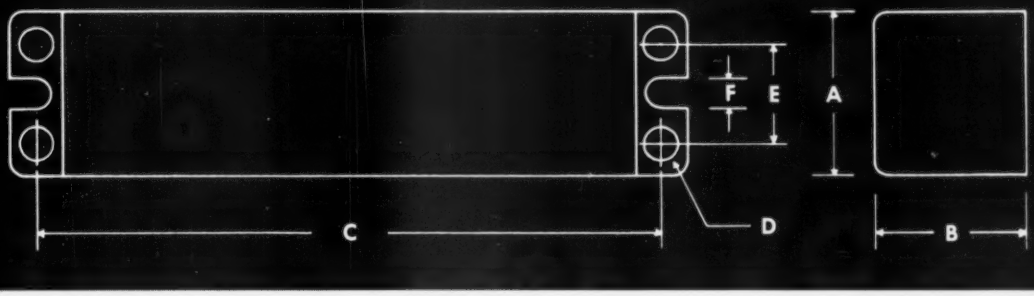
"If we, as consulting engineers, want to continue to prosper, we should find a means for evaluating engineers in private practice. We must develop some sort of check sheet, with which the client could competently select the consultant he needs for a particular project.

"You see a client who has never set foot in a consultant's office awarding the engineer a contract with a $100,000 fee. Maybe the consultant only has four or five employees, yet is expected to have the project completed in about six months. This is unrealistic, and as a result you see some projects with very inferior engineering work. This is a problem the profession must solve." ▲▲



HOW CBM ASSURES YOU BETTER BALLAST VALUE

New recommended standards for ballast cross section and mounting dimensions aid fixture designers, architects, engineers, add flexibility for purchasing and replacement.



DIMENSIONS (INCHES)

	(MAXIMUM) CROSS SECTION		LENGTH (NOMINAL)										CORNER MTG. HOLES		CENTER (MAX.) MTG. SLOT
	A (WIDTH)	B (HEIGHT)	C (MOUNTING)										D (DIA.)	E (WIDTH)	F (WIDTH)
1	2-3/8	1-11/16	6	7-13/16	8-57/64	9-17/32	11-1/4			14-7/16	15-7/16			15/64 or 7/32	1-11/16	5/16*
2	2-13/16	2			8-57/64		11-1/8		13-3/4					15/64 or 7/32	2	5/16
3	3-1/8	1-25/32			8-57/64		11-9/64		13-3/4					15/64 or 7/32	2	5/16
4	3-3/16	2-3/8			8-57/64		11-9/64		13-3/4				18-5/8	15/64 or 7/32	2	5/16
5	3-3/16	2-5/8			8-57/64		11-9/64	13	13-3/4		15-5/8	16-1/8	18-5/8	15/64 or 7/32	2	5/16

*Drawn cases use center slot only for mounting.

HERE'S an example of CBM at work to give the fluorescent lighting industry better ballast value. As the result of a study by one of the technical committees of the Certified Ballast Manufacturers Association . . .

22 different cross section dimensions for ballasts were cut to 5;

35 different mounting lengths were reduced to 14.

Obviously, this offers practical advantages to fixture manufacturers and engineers in the design of new units—and makes for a wider choice of component sources.

But this is over and above the basic contribution of CBM—the specification that assures quality performance from ballasts . . . including high light output, long lamp life, high power factor, long life service . . . with conformance checked and certified by Electrical Testing Laboratories. And of course, Certified CBM Ballasts are UL listed!

Learn why Certified CBM Ballasts serve you better . . . why it pays to specify fluorescent fixtures equipped with CBM Ballasts as their control center. Write for: *How to Insure Your Lighting Investment.*

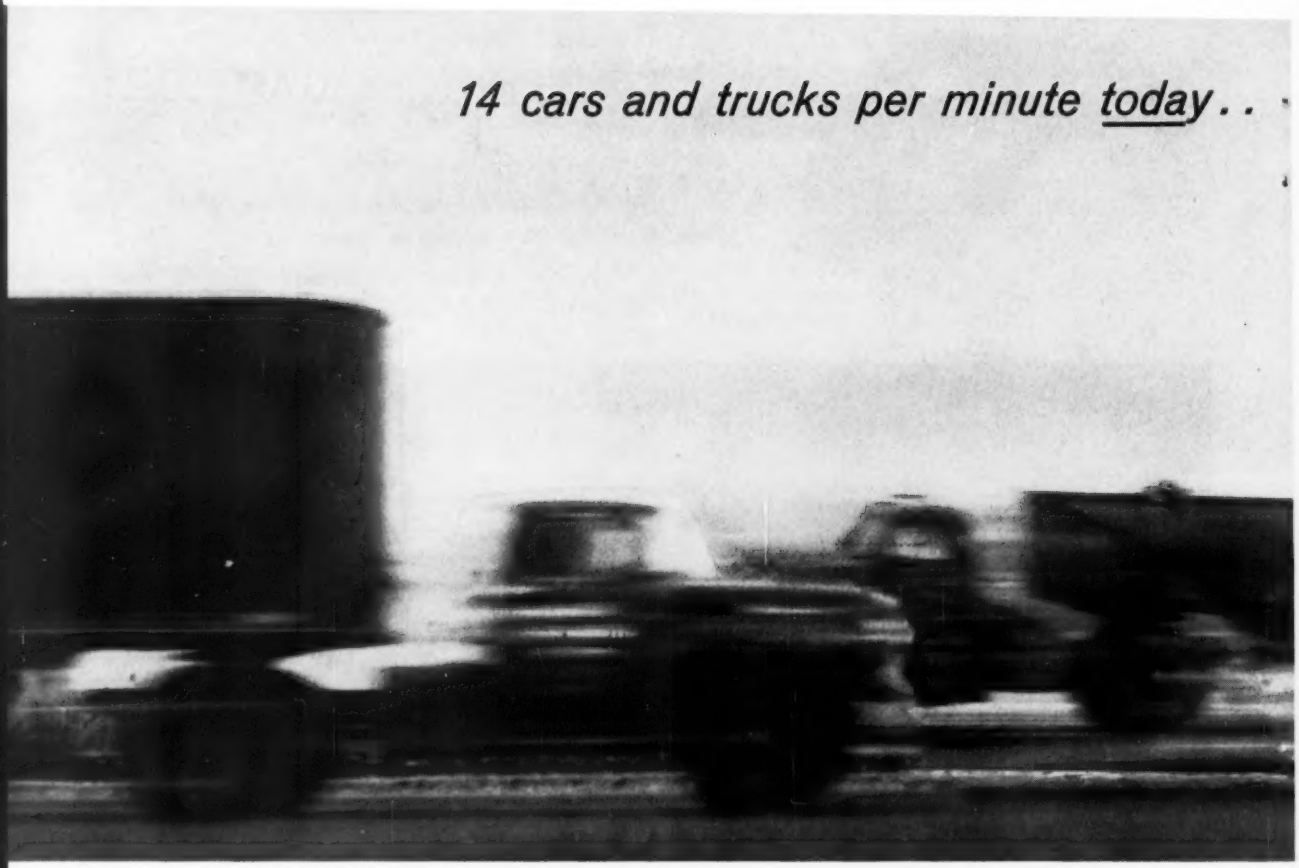
Chairman of CBM Technical Committee on study of ballast case dimensions discusses a point with a colleague . . . one of many sessions.

CBM CERTIFIED by ETL

CERTIFIED BALLAST MANUFACTURERS

2116 KEITH BUILDING
CLEVELAND 15, OHIO

Participation in CBM is open to any manufacturer who wishes to qualify



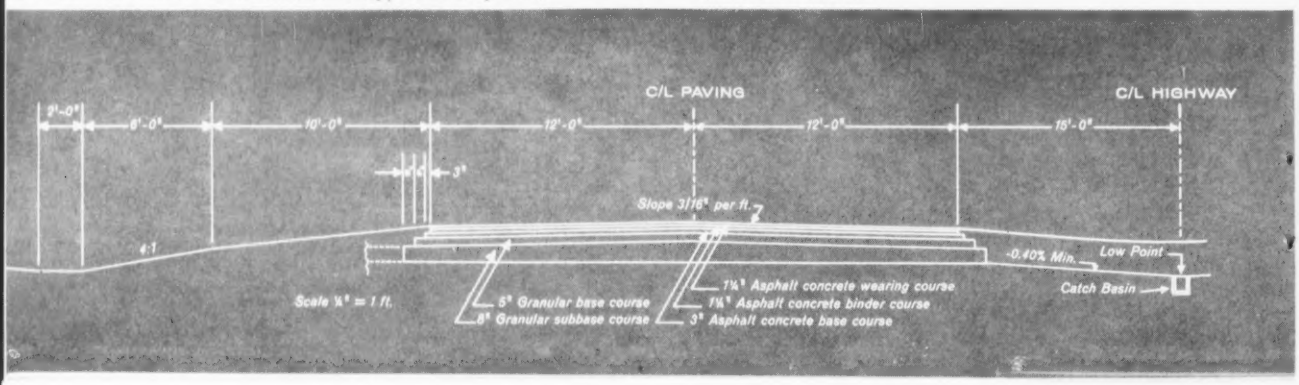
Here's one reason why Ohio's

Pounding traffic! Growing traffic volume! Greater and greater axle loads!

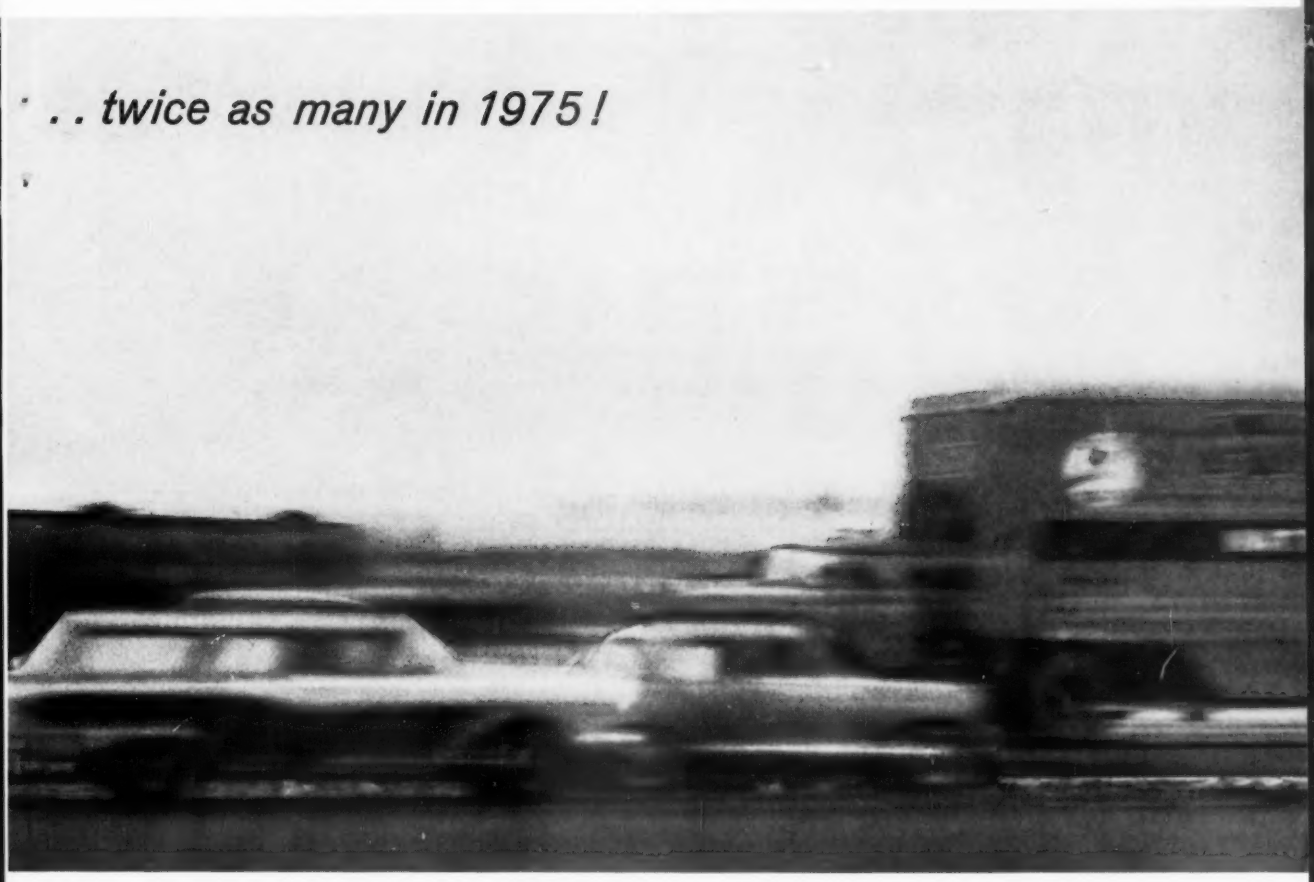
These assaults on pavement structures are **not** restricted to the 90-10 Interstate highways. They're common problems faced by engineers responsible for thousands on thousands of miles of road like Ohio's new State Route 73 . . . roads which are to be built largely out of State funds and wholly maintained with these monies.

In most terrain these roads . . . like your Interstate roads . . . should be Asphalt-paved. For many reasons! Perhaps the **most** important is that modern Asphalt

Typical of modern heavy-duty Asphalt sections is this one for Ohio's 5-mile State Route 73 between Middletown and Franklin. Median section is modified to a raised and curbed 15-foot section in urban areas. Pavement must support a heavy traffic of trucks carrying steel, machine tools and other industrial products produced locally. Cost per sq yd for this Asphalt road $3.03; $2.00 per sq yd under the prevailing price for reinforced concrete.



. . twice as many in 1975!



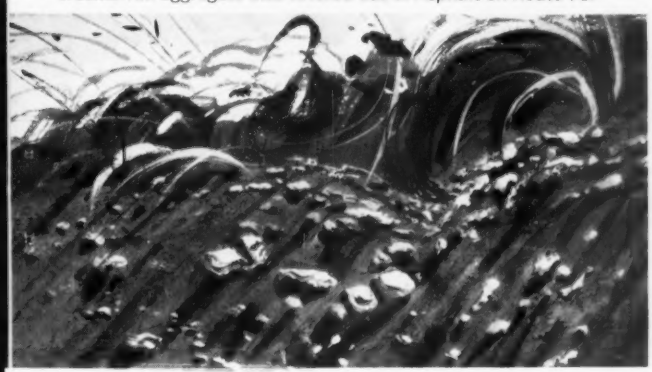
new Route 73 is Asphalt-paved

pavement structures are being built today to handle **any** desired loads with **any** desired built-in durability . . . **and these roads save money.** Cost less to build, less to maintain.

Your State can lay **more** road . . . if you design for Asphalt concrete. More road means the traffic load on **all** pavements in your State can be kept at a maintenance-saving minimum.

THE ASPHALT INSTITUTE
Asphalt Institute Building, College Park, Maryland

Glacial till in right-of-way favored Asphalt pavement construction. Whenever sub-soil of this type is found it provides excellent natural subgrades for Asphalt paving. Proximity of suitable crusher-run aggregate also favored use of Asphalt on Route 73.



Comfortable! Durable!...because it's modern Asphalt concrete. Notice the smooth-riding, skid-resisting surface. Notice the visibility, too, of the traffic markings on Route 73. With Asphalt concrete, this road sets a standard for quality construction.

NEW! Cast Iron That Bends Under Stress!

AMERICAN DUCTILE IRON

A new super-service line of pipe, tubing, casing, fittings and special castings has been developed by the American Cast Iron Pipe Company and designed to meet the special service requirements of high internal pressures, heavy external loads and extreme shock. This new line of products is produced of AMERICAN DUCTILE Iron.

Another in a long list of AMERICAN "firsts," AMERICAN DUCTILE Iron products are the first of their type to be manufactured in commercial quantities in the United States. Already widely accepted, many thousands of feet of AMERICAN DUCTILE Iron pipe are now in service throughout the country.

AMERICAN DUCTILE Iron offers the proven corrosion resistance of gray cast iron combined with ductile characteristic approaching those of steel. This combination assures long service life, extraordinary dependability and increased factors of safety for extreme service conditions.

Get detailed information on AMERICAN DUCTILE Iron products, including grades, specifications, tests and representative materials produced of this unusual metal. Call or write the American Cast Iron Pipe Company sales office or representative nearest you.

STRENGTH—Withstands internal pressures and external loads

TOUGHNESS—Absorbs shock and stress

DUCTILITY—Bends and twists under load . . . but doesn't break

LONG LIFE—Excellent corrosion resistance . . . confirmed by tests

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AMERICAN CAST IRON PIPE CO.
BIRMINGHAM ALABAMA

Readers' Comment

Soils Testing Laboratories

Sir:

In your November 1958 issue under the "Heard Around Headquarters" column, CONSULTING ENGINEER quotes me as saying that "Testing laboratories, and other semiprofessional and subprofessional organizations, are offering what purports to be soils engineering services, but which is really subprofessional work, ranging in quality from fair to abominable."

I have had a letter from a distinguished soils engineer, a vice president of a testing laboratory, who is very much disturbed over implications which he believes will be read into that statement. The basis of his distress seems to be a feeling that the reader will take "testing laboratories" to mean "all testing laboratories" — which it certainly does not.

So, to keep peace in the family, let me make myself quite clear. The quoted statement was part of a discussion in which criticism was aimed at organizations and individuals who do poor work in the field of soils engineering. My statement was not aimed at all testing laboratories. And to be complete, it should have mentioned professional organizations (not all professional organizations, just some) and engineers as well.

There are some testing laboratories in the U. S. that are doing soils engineering work of professional grade. My critic is connected with one of them. There are others whose work in that field is very poor. I have been asked to work with such data more than once.

David M. Greer, P. E., President
Greer Engineering Associates, Inc.
Montclair, New Jersey

30-Million Kilowatt Station

Sir:

I beg to inform you that there is a big mistake on page 8 in your December issue, in the following phrase: " . . . the project includes a 30-thousand kilowatt power station . . . " The right number is 30-million kilowatts.

This Inga Project in the Belgian Congo represents the biggest energy potential in the world.

A. Tourne
Compagnie Africaine des
Ingenieurs-Conseils
Brussels, Belgium

• READERS CAN LEARN MORE ABOUT THE DARK CONTINENT'S MAMMOTH HYDROELECTRIC PROJECTS IN THE JANUARY ISSUE. SEE "THE CONSULTANT IN SOUTH AFRICA."

Highway Department Empires

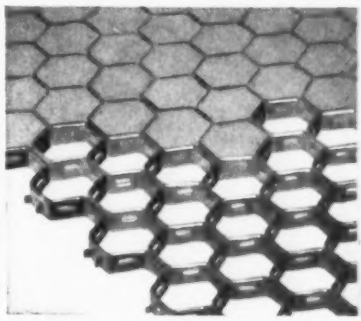
Sir:

The facts are obvious to anyone who has had contact with the highway departments over the last 25

"GRIDSTEEL"
Pays for itself!

...You save
two ways with
IRVICO "Gridsteel"

1. Initial low cost
2. Reduction of floor maintenance costs



"Gridsteel" protects floors from the damage normally caused by impact, skidding, vibration and heavy traffic. "Gridsteel" is made of steel bars on edge, joined together in a honeycomb mesh pattern. No potholes or ruts can form because any crack in the fill cannot spread beyond a single steel mesh.

"GRIDSTEEL"
will protect floors
made of wood,
concrete,
or asphalt.

Write today for complete information
Ask for 20-page color catalog
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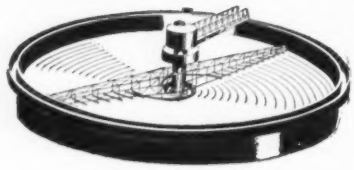
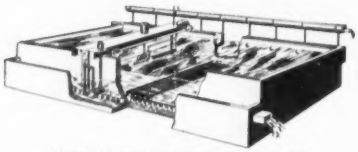
HARDINGE PROCESS EQUIPMENT

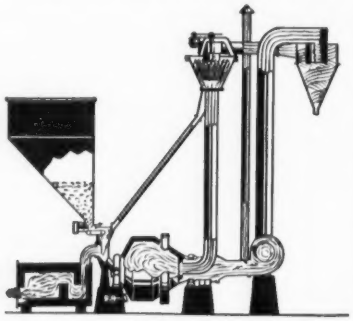


CIRCULAR CLARIFIERS

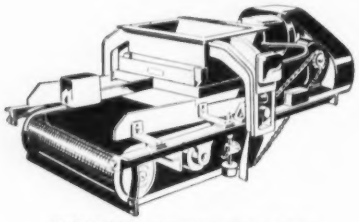
INDIRECT-HEAT ROTARY DRYERS



AUTOMATIC BACKWASH SAND FILTERS



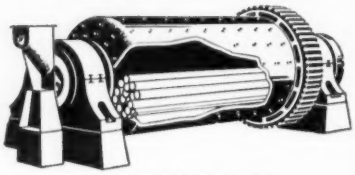
COMPLETE GRINDING SYSTEMS



CONSTANT-WEIGHT FEEDERS

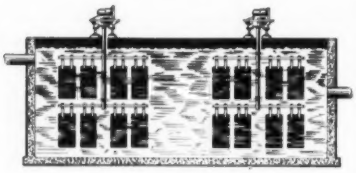
RECTANGULAR CLARIFIERS

ROTARY COOLERS



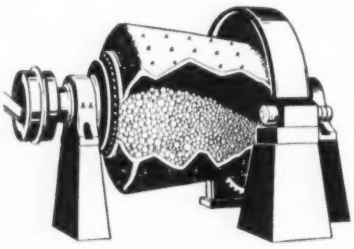
ROD AND TUBE MILLS

HYDRO-CLASSIFIERS

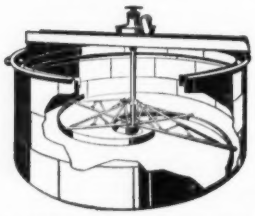


FLOCCULATING UNITS

DIRECT-HEAT ROTARY DRYERS



BALL AND PEBBLE MILLS



"AUTO-RAISE" THICKENERS

Write for Hardinge Equipment Catalog 100-B-64.

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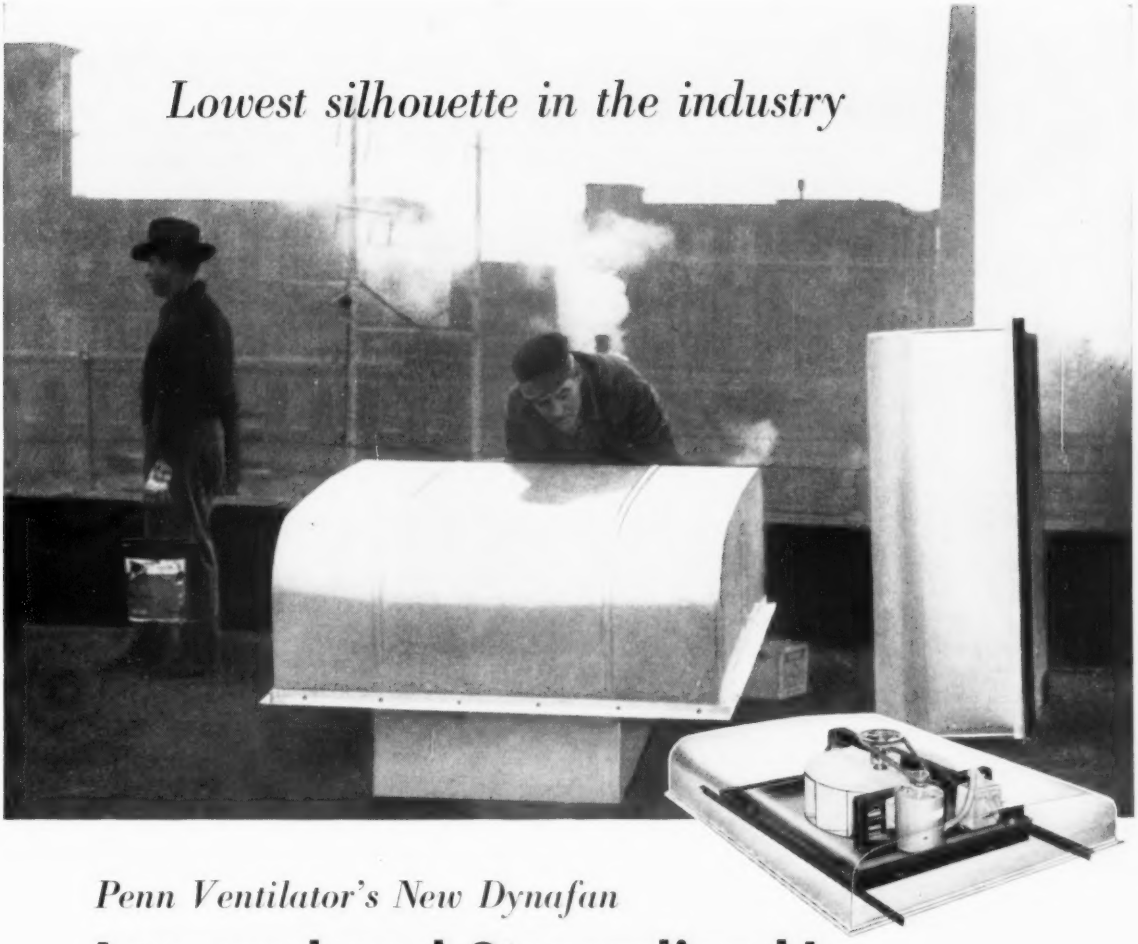
years that the consulting engineer's position today is exactly the same as the contractor's was years ago when the highway departments had built up big organizations to do their work with day labor. Later a change in contract practices came about not by any virtue of the highway departments, but because contractors' organizations forced it. This was such a realistic and beneficial change that the highway departments now are proud of it and would not go back to the old wasteful day labor methods.

The same advantages would accrue if the highway departments retained consultants for their engineering work instead of building up empires. In many of the states the highway departments are advertising for engineers, and their advertisements include statements of sick leave benefits, retirement pensions, etc., the implication being that the young man who goes to work for the highway department will have a permanent job after this accelerated highway program is completed. Most of us have enough experience with governmental agencies to know that these people will stay on and that the highway departments will be top-heavy with personnel after this program is completed.

In one state I know of there was approximately the same mileage of construction (during the 1920's) as is going on in that state today on the interstate program. The only difference is that some of the new construction is 4-lane construction, which means an additional 2-lane bridge alongside an existing 2-lane bridge, or a new 4-lane bridge. The highway department has been greatly inspired by the bridges that were built 30 years ago. Where there was an existing swing span they designed another one to go alongside of it whether or not there was any navigation in that waterway. This applies to lift bridges and every other type of bridge that has been constructed. Their designs for smaller structures are



Penn Ventilator's New Dynafan

Lowered and Streamlined!

Low-Contour Dynafan. That's the name we've given to our new roof exhauster. It cuts almost 50% off normal roof exhauster heights . . . and its lines are cleaner, more modern. The Low-Contour Dynafan is the safest insurance that clean lines designed into modern buildings will not be compromised. And for more uniform appearance, the same modern housing is available for use as supply and relief units.

The new Low-Contour Dynafan is more than just low and clean-lined. Major engineering advances are incorporated . . . for example, you won't find the motor atop the wheel as with other roof exhausters, and you won't find the vibration-prone overhung shaft, either. Instead, noise has been cut appreciably by straddling . . . now the fan wheels are supported between sealed ball bearings located above and below the wheels. And the entire fan unit floats on vibra-sorb vibration eliminators. In addition, exact type motors to fit your particular service condition are supplied.

Get all the details on Penn Ventilator's new Low-Contour Dynafan. Call your local Penn Ventilator representative, or write to Penn Ventilator Co., Philadelphia 40, Pa.

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GOODMAN & ALLEGHENY, Philadelphia 40, Pa.
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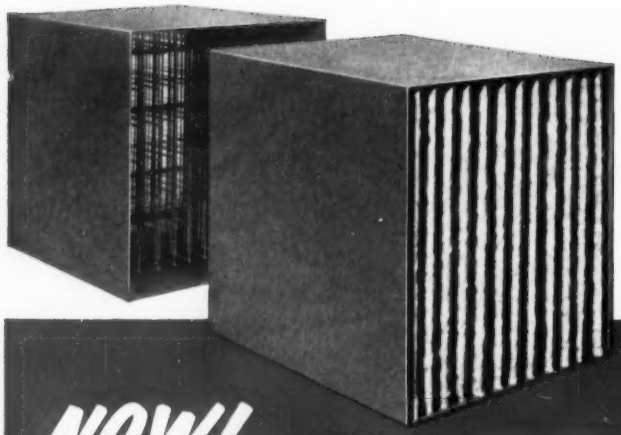
Charter member of AMCA

Distribution throughout Canada



NOW! Cambridge AEROSOLVE® Filters Available in HIGH VELOCITY MODELS!

80% More Air per sq. ft. face area

45% Less Area per given cfm.

. . . at No Increase in Pressure Drop

Already famous for its low owning and operating cost, the Cambridge AEROSOLVE Filter in the new high-velocity models offers even greater economies. Compare:

	High-Velocity AEROSOLVE	Standard AEROSOLVE
Rated Capacity (24" x 24" face area)	1800 cfm.	1000 cfm.
Face Velocity	450 fpm.	250 fpm.
Area of Filter Medium	86 sq. ft.	43 sq. ft.
Ratio, Filter Area to Face Area	21.50 to 1	10.75 to 1

Choice of 3 Efficiencies

High-velocity AEROSOLVE cartridges are, like the Standard models, available in efficiencies of approximately 95%, 85% and 35% (discoloration test wi'' atmospheric dust). All cartridges are interchangeable ar .re easily secured in permanent cadmium-plated frames by quick-acting fasteners at the corners. No other strainer-type air filter of comparable efficiency approaches the low pressure drop of these units.

Other than infrequent cartridge changes, AEROSOLVE filters require no maintenance. Installation is also low in cost. In high-velocity systems, the new units obviate the need of V-ing the filter bank and result in even greater installation and maintenance economies.

Write for Bulletin 130

Cambridge Filter Corporation

730 E. Erie Blvd., Syracuse 3, N. Y.

Makers of the ABSOLUTE® Filter— World's Most Efficient Air Cleaning Device

REPRESENTATIVES IN PRINCIPAL CITIES

frozen with standard plans which have all of the drawbacks that such boilerplate type of work encourages. Thirty years ago when they were doing annually the same number of bridges and miles of roads, the highway department operated with about 10 percent of the office space they have at the present time. It seems a fair assumption that they probably are operating with about ten times as many personnel, which personnel will be on the backs of the taxpayers from now on.

The Automotive Safety Foundation, whose directors are composed of some of the largest business firms in the country who have been fighting socialism, in a recent recommendation to the Pennsylvania Department of Highways declared that Pennsylvania should go all out for socialized engineering by building up its highway department. (See "Field Notes," pg. 132.)

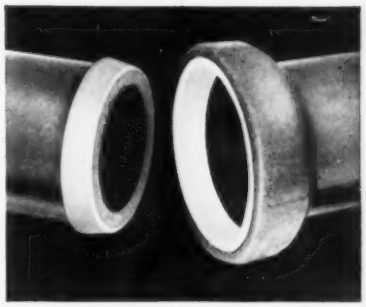
Since that recommendation, the awards for the American Institute of Steel Construction annual competition have been announced. While this is not a perfect measure of the capability of bridge engineers, it is probably the best one that we have available. Of the fourteen awards made by the American Institute of Steel Construction for bridges opened to traffic last year, twelve of them were to consultants and two of them were to state highway department personnel. Yet it is probable that the highway departments designed ten times as many bridges as the consultants.

Also consider the facts brought to light by the Hoover Commission and the Fund for the Republic study of government. Their reports flatly state that where private enterprise can do a job it invariably is done better by private enterprise than under any governmental body. These statements were made by Dr. Adler and Dr. Larson in recent interviews by Mike Wallace. The wording is not exact, but the substance is there.

Anonymous

longer, stronger AMVIT Jointed Clay Pipe prevents infiltration SIX WAYS

Bottletight, Factory-Made Joint of Plasticized Resins of Polyvinyl-chloride gives lower cost-in-place



Engineering standard and specifications for sanitary sewers are written so that both the contractor and the community can obtain the best type of construction.

They limit the amount of infiltration in sewer pipe joints, which, in turn, reduces pumping and treatment plant costs. Amvit* Jointed Clay Pipe was especially designed to achieve best possible results.

1. FACTORY-MADE QUALITY

The Amvit Joint is manufactured from plasticized resins of polyvinyl-chloride. No other combination of materials is used or needed. It is applied on the pipe by a special manufacturing process and delivered to the job site ready for immediate installation.

2. DESIGN PREVENTS LEAKS

The Amvit Joint is a compression type joint based on the ball and socket principle. The material on the spigot end is a convex shape, with the bell end in a concave shape. Simply pushing the pipe together "makes" the joint, keeping the surfaces of the bell and spigot rings in constant compression. Thus, infiltration, exfiltration, and root penetration are prevented.

3. QUICK, FOUL-PROOF INSTALLATION

The joint is on the pipe delivered to the job site ready for immediate installations. No other materials such as caulking, joint compound, hot pots, or ladles are needed to make the Amvit Joint.

4. PERMITS DEFLECTION, ABSORBS SHOCKS

Amvit is made from a plastic which has many characteristics similar to rubber. It is pliable, permitting deflection without leakage. It is resilient, can absorb shocks, and vibration.

5. BETTER FLOW, LESS MAINTENANCE

The design of the joint assures that the pipe is self-centered at all times. This gives perfect alignment and self-cleansing action. Because the joint is really tight, no foreign matter such as dirt, sand, or stones can possibly enter the line.

6. COMPLETE FITTINGS

Amvit is furnished on all standard fittings, as well as pipe. This will permit a uniformly tight line from house to treatment plant.

Amvit Jointed Clay Pipe, in sizes 4" through 24", together with all fittings is available for immediate delivery in the Northeast and Central States.

For more information on how Amvit can help cut your sewer installation costs, write or call American Vitrified Products Company, National City Bank Building, Cleveland, Ohio, or our office nearest you, for this descriptive folder.

* T. M. Registered

SINCE 1848

AMERICAN

American Vitrified Products Company

CLEVELAND, OHIO

PLANTS ACROSS THE NATION . . . Brazil, Indiana · Chicago, Illinois · Cleveland, Ohio · Crawfordsville, Indiana · Detroit, Michigan · East Liverpool, Ohio Fenton, Michigan · Grand Ledge, Michigan · Lisbon, Ohio · Los Angeles, California · Milwaukee, Wisconsin · South Bend, Indiana · St. Louis, Missouri · Whitehall, Illinois

Mahon ROLLING DOORS are

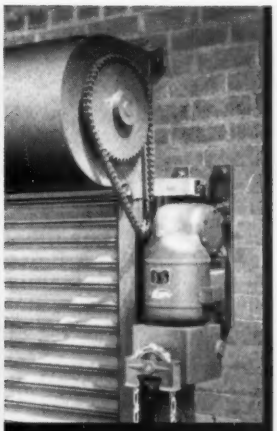
THE STEEL CURTAINS OF ALL MAHON ROLLING DOORS ARE BONDERIZED

Above are Two Mahon Power Operated Rolling Steel Doors, divided by Mullion, installed in a combination Truck and Railroad Opening 36'-9½" x 23'-0". The Railroad enters the plant at an acute angle. Large door at right is opened only for movement of railroad cars. Mullion moves to right jamb on overhead track.

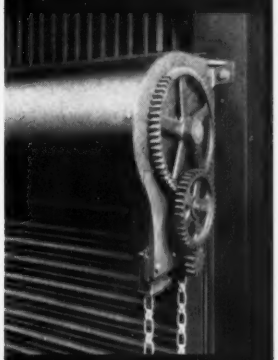
Serving the Construction Industry Through Fabrication of Structural Steel, Steel Plate Components, and Building Products

Versatile in Application . . . Will Serve You Better in Any Type of Opening!

In Operation, the Fast, Vertical Roll-up Action Saves Valuable Time and Space — No Overhead Tracks to Restrict Headroom



MAHON STANDARD POWER OPERATOR 920-P



MAHON CHAIN-GEAR OPERATOR

MANUALLY, MECHANICALLY, or POWER OPERATED DOORS
STANDARD or UNDERWRITERS' LABELED

☆ OTHER MAHON BUILDING PRODUCTS and SERVICES:

- Insulated Metal Curtain Walls
- Underwriters' Rated Metalclad Fire Walls
- M-Floors (Electrified Cellular Steel Sub-Floors)
- Long Span M-Decks (Cellular or Open Beam)
- Steel Roof Deck
- Permanent Concrete Floor Forms
- Acoustical and Troffer Forms
- Acoustical Metal Walls and Partitions
- Acoustical Metal Ceilings
- Structural Steel—Fabrication and Erection
- Steel Plate Components—Riveted or Welded

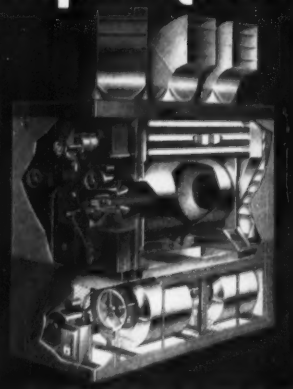
☆ *For INFORMATION See SWEET'S FILES or Write for Catalogues*

THE R. C. MAHON COMPANY • Detroit 34, Michigan
Sales-Engineering Offices in Detroit, New York and Chicago
Representatives in all Principal Cities

of Steel and Aluminum

MAHON

Super-Quiet



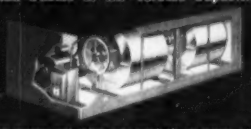
LENNOX

"OG" SERIES INDUSTRIAL HEATER

- Blower moves huge volumes of air at extremely quiet sound levels
- Rugged blower shaft design eliminates vibration problems

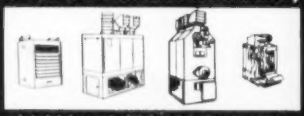
The "OG" blower incorporates self-aligning, permanently lubricated ball bearings. Blower motor is mounted on adjustable slide rails, and the entire section is easily accessible for service. This is just a sampling of why the "OG" is "stepping ahead" in industrial heating.

Wide Choice of Air Volume Capacities



Blower motors and drives are available to satisfy all air volume requirements up to 2 in. external static pressure.

LENNOX "Task Matched" Equipment to control and condition air for industry



64,000 to 2,000,000 Btuh Units

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LENNOX Industries Inc.

INDUSTRIAL DIVISION
Box 1294, Dept. CE-2
Des Moines 5, Ia.

Please send me—without obligation—complete specifications and engineering data on Lennox "OG" Series Industrial Heaters

Name

Company

Address City

Title

The Legal Aspect

MELVIN NORD, P.E.
Consultant in Legal and Technical Problems
Patent Attorney

The Law of Real Property: Oil and Gas Rights

WE HAVE POINTED OUT that under certain circumstances mineral rights may be so extensive as to be properly regarded as the ownership of the minerals in place. This is particularly true of solid minerals. However, when we consider liquid and gaseous minerals (oil and natural gas), the problem is more complicated because these minerals have a tendency to move from one person's land to another's. Thus, a separate body of law has evolved around the important subject of oil and gas rights.

Property Rights in Oil and Gas

As a general principle it can be stated that the owner has the sole right to extract oil and gas from his land unless he has granted that right to another. However, according to the weight of authority, gas and oil in place are not subject to ownership until reduced to possession. Thus, the owner of the land has the right to extract the oil and gas, but he does not have title to them unless and until he actually recovers them. His right is very similar to a profit a' prendre except that it is a right in his own land instead of a right in the land of another.

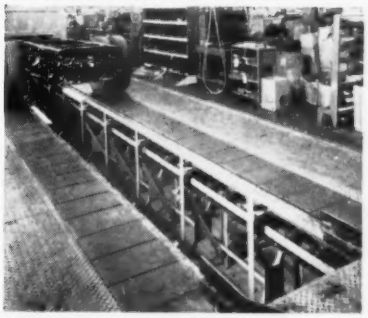
The reason for this rule is simply that nobody can own anything that has not been reduced to possession. The farmer does not own the wild bird that alights on his land. Thus, oil and gas are subject to the "law of capture," just as are surface waters—or the air—which tend to move uncontrolled from place to place.

Limitations on Oil and Gas Rights

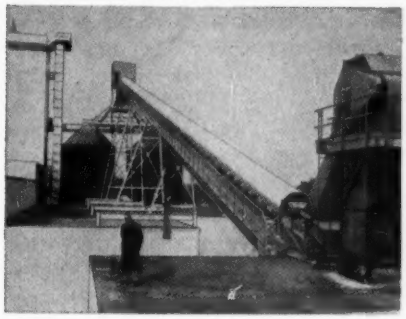
At the common law, the owner of the land has an unlimited right to extract oil and gas from his land. But it often happens that a reservoir of oil or gas extends beneath the land of several persons, rather than being confined to one person's land. Then, it is clear that if A extracts oil or gas from his land at a very high rate, additional oil or gas will flow from the portion of the reservoir under B's land to the portion under A's land. This makes it possible for the greediest person to obtain much more than his fair share. Under the common law—the law of capture—this is perfectly permissible, even though it may be rather underhanded. It even has been held that the explosion of nitroglycerin in a well in order to increase production is in no way subject to legal objection.

It should be kept in mind, however, that while A can remove oil or gas from under B's land by this indirect method, he is not permitted to do so directly. He is not permitted to drill a well at an angle so that it terminates under the land of his neighbor. He can drill as close to the boundary line as he

TRUCK ASSEMBLY SYSTEM

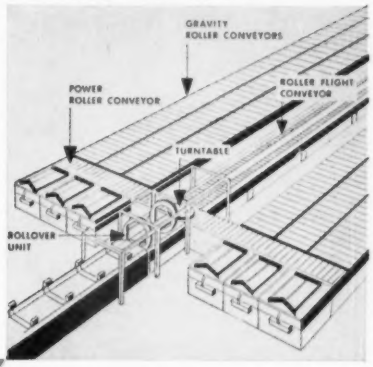


LOG AND CHIP HANDLING SYSTEM



AUTOMATIC SHAKEOUT SYSTEM

ENGINE BLOCK HANDLING SYSTEM



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PV FINDS THE ANSWERS

If you have a production, materials handling, or automation problem, "PV" will save time and money, and increase efficiency and production. "PV" stands for *Planet Versatility* . . . a quality that has made Planet Corporation known throughout industry as an organization that has the solutions to the most perplexing problems.

Planet Corporation is an organization of experienced, creative engineers who, by applying uninhibited thinking to your problems, save your time in finding workable solutions that increase your efficiency. No job is too big or too difficult — they have designed complete foundrys, automated production lines, built bulk and unit materials handling systems, developed the world's only true universal transfer device . . . all types of special handling and automation machinery, and materials handling equipment.

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- ENGINEERED HANDLING SYSTEMS
- AUTOMATION EQUIPMENT
- FOUNDRY HANDLING SYSTEM

1823 SUNSET AVENUE
LANSING, MICHIGAN

91

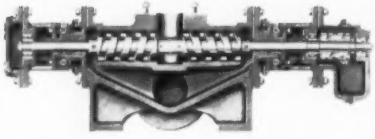
Sier-Bath SCREW PUMPS

handling heavy wax-rubber material in coating and laminating work at MARATHON, a Divison of American Can Company

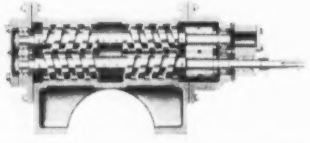
Over 3 years' reliable service, operating 24 hours a day, 5 days a week.

At the Marathon Corporation, Menasha, Wisconsin, four external gear and bearing type Sier-Bath Screw Pumps move heavy Parafilm material from storage cones to coating machines. Each pump has a capacity of 10 gpm. at 200°F., discharging at 50 psig. Float valves in coating machines actuate pumps approximately every 15 seconds round the clock to maintain constant level. Excellent service, with low maintenance, is reported.

Sier-Bath SCREW PUMPS



External Gear and Bearing Bracket Type for non-lubricating liquids and semi-liquids



Internal Gear and Bearing Type for lubricating liquids and semi-liquids

Sier-Bath Screw Pumps maintain high volumetric efficiency because "Dual-Controlled" precision rotor design prevents rotor-to-rotor or rotor-to-casing contact—provides a continuous flow without pulsation, hammering or vibration . . . without strains, misalignment and wear on rotors, shafts, bearings and gears.

Result: Dependable, uninterrupted pumping service—less maintenance—easier servicing—longer pump life—lower overall pumping costs.

Capacities from 1 to 2,000 gpm.; viscosities from 32 SSU to 1,000,000 SSU.; discharge to 1,000 psi. for viscous liquids, 200 psi. for water and light oils. Horizontal or vertical construction. Corrosion resistant alloys, special bodies, stuffing boxes and bearings for special needs. See "Yellow Pages" for your Sier-Bath representative or write Sier-Bath Gear & Pump Co., Inc., 9257 Hudson Blvd., North Bergen, N. J.

Sier-Bath ROTARY PUMPS

Screw Pumps | Gearex® Pumps | Hydrex® Pumps

Founded 1905 | Mfrs. of Precision Gears, Rotary Pumps, Flexible Gear Couplings | Member A. G. M. A.

wishes, but he cannot cross it either above or below ground level.

Interference

In certain exceptional situations it has been held that activity on A's land that indirectly affects B's land is legally objectionable. For example, the owner of an unproductive well may be compelled to close it if the entering air finds its way through a subterranean fissure into his neighbor's productive well and interferes with pumping.

Thus, it can be concluded that the owners of adjoining land are free to use their own land as they see fit to extract oil or gas from a subjacent oil or gas reservoir; but they are not free to interfere with their neighbor's efforts to do the same. This distinction—the most basic distinction in our entire legal system—is the difference between persons competing freely for benefits which they are equally entitled to seek, and persons seeking to injure the ability of their neighbors to compete freely for benefits. It is the difference between getting ahead in the world by making good use of your own rights, and getting ahead in the world by interfering with the rights of others.

Statutory Regulations

Most states possessing oil or gas deposits in significant quantity no longer leave it to the law of capture to determine the rate of extraction of oil or gas from reservoirs.

In the past, statutes were enacted to regulate the amount of production so as to prevent flooding the market with oil, thereby maintaining prices at profitable levels. These statutes eventually were held to be unwarranted interferences with the rights of the owners of land and therefore unconstitutional.

Later, similar statutes were enacted to regulate the rate of production of oil and gas, but these were stated to be for the purpose of preventing waste of natural resources. For example, it is known that excessive extraction rates of

ENGINEERS "DISCOVER" ALCOA CONDUIT

Lower cost, installation economies, corrosion resistance make Alcoa Aluminum the best conduit buy

An increasing number of cost-conscious engineers are switching to aluminum rigid conduit for office buildings, industrial plants and other new and remodeled structures. Here are some of the reasons why:

- Lower prices plus light weight and ease in handling make Alcoa® Aluminum Conduit installations competitive.
- Corrosion resistance of aluminum means less maintenance, freedom from staining.
- Aluminum is easier to cut, bend and thread. Wire pulling is easy, too, because of specially treated internal surface.
- Nonmagnetic aluminum offers up to 20 per cent less voltage drop.
- Clean, modern appearance complements modern architecture.
- Aluminum is nonsparking and has Underwriters' Laboratories, Inc., approval.

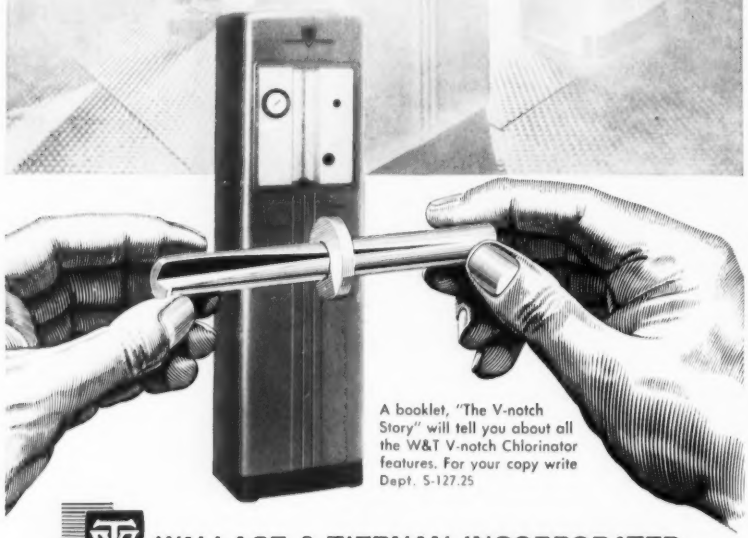
Find out why Alcoa Aluminum is your best conduit buy. Contact your electrical distributor, or write Aluminum Company of America, 2145-B Alcoa Building, Pittsburgh 19, Pennsylvania.

Your Guide to the Best in Aluminum Value

The Texas Company, Lockport, Illinois

the V-notch
is the difference in chlorine control

Safe chlorine control is the job of a chlorinator.
This control, the V-notch, does the job completely.
Yet it appears to be simply a grooved plug in a ring.
It is, of course, more than that... much more.
The groove in the plug is precision milled and shaped so that when you turn the control knob on your chlorinator and the plug slides through the ring, the size of the opening between the groove and the ring changes an exact amount. You meter chlorine exactly and simply because every position of the plug in the ring makes a repeatable orifice size—a repeatable chlorine flow rate.
Only in a W&T V-notch Chlorinator is control so simple, so true, so precisely right.
And, of course, the right plastics make the whole chlorinator chlorine-proof.



A booklet, "The V-notch Story" will tell you about all the W&T V-notch Chlorinator features. For your copy write Dept. S-127.25

WALLACE & TIERNAN INCORPORATED
25 MAIN STREET, BELLEVILLE 9, NEW JERSEY

W&T DRY CHEMICAL FEEDERS

For Accurate Feeding Of Water Treatment Chemicals

Full line of wide range dry chemical feeders capable of controlling a few ounces to 3000 lbs. per minute.

Write for Bulletin M-38 for complete Dry Feeder information.

WALLACE & TIERNAN INCORPORATED
25 MAIN STREET, BELLEVILLE 9, NEW JERSEY

oil will pull gas along with the oil. This lowers the reservoir pressure and ultimately reduces the total yield of oil. These statutes have been held to be valid.

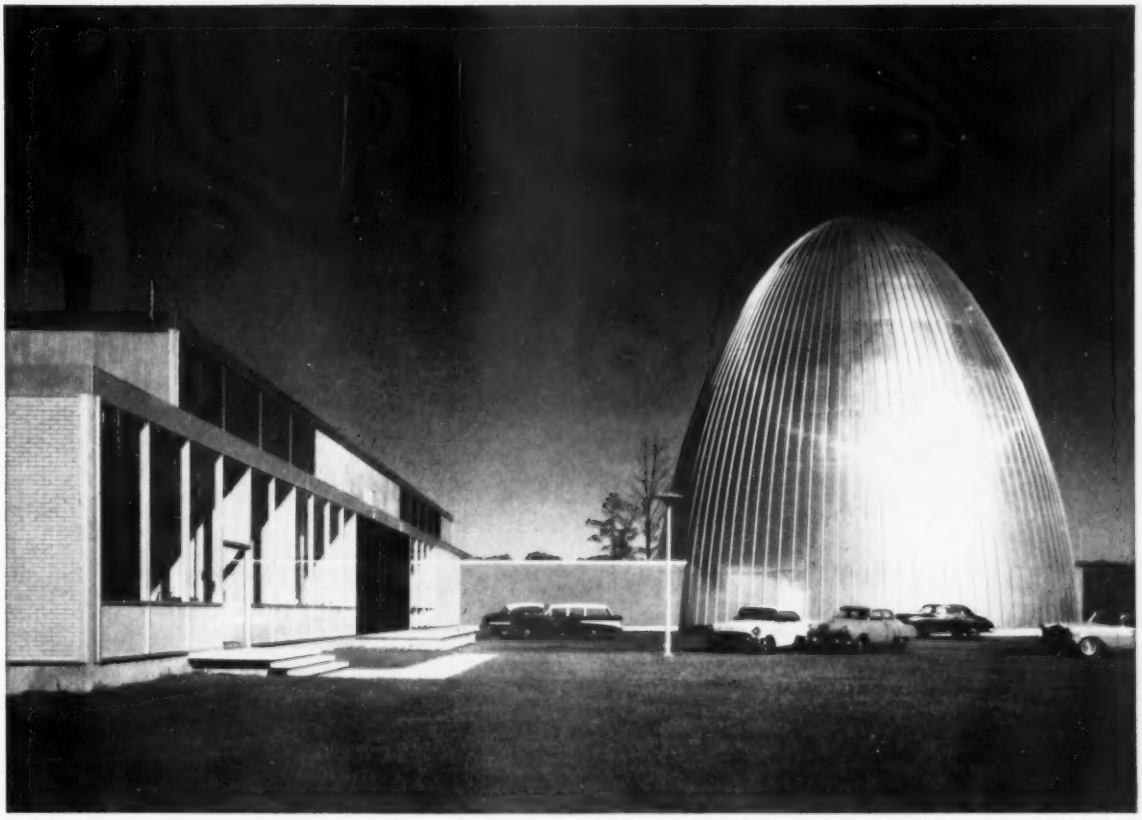
Extent of Regulation

The gas and oil industry currently is subjected to statutory regulation extending to production, sale, manufacture, storage, distribution, and utilization. A few examples will indicate the extensive nature of regulation: (1) spacing or location of wells, (2) number of wells in an area, (3) requirement of bonds for drilling, (4) regulation of the disposal of wastes, (5) compulsory plugging of nonproductive wells, (6) preservation of a proper gas-oil production ratio, (7) prevention of wastage of gas, (8) limitation in output to a designated percentage of the potential production, (9) proration of production among producers, (10) limitations on the allowable uses of natural gas from wells, (11) regulation of the transportation of oil or gas, (12) regulation of pipelines, (13) regulation of storage, (14) inspection and testing of petroleum products and fixing of quality standards, and (15) licensing of distributors.

Thus, at the present time, there are comprehensive statutory regulations controlling the rates of extraction of oil and gas. The statutes of a particular state involved must be consulted to determine the law in any specific instance. In addition, there are also a number of Federal statutes, some of which are designed to assist the states in enforcing the states' own regulatory schemes. ▲▲

Expert Witness Reprint

Robin Beach's five articles on "The Engineer as an Expert Witness" are available in a 16-page reprint for $1.00. Please write to: Reader Service Dept., CONSULTING ENGINEER, 217 Wayne St., St. Joseph, Mich.



Enjay Butyl window-sealing tape was employed throughout the newly erected Industrial Reactor Laboratories in Plainsboro, N. J. Architect: Skidmore, Owings & Merrill

ENJAY BUTYL

caulking prevents leakage in new Atomic Reactor Lab

Butyl caulking tape permanently seals joints and copings against leakage in this new Atomic Reactor Lab. Tough, weather-resistant Butyl helps provide long-lasting protection against all climatic conditions. Enjay Butyl was chosen to do this job because of its inherent resistance to sunlight, ozone, moisture, aging and vibration.

Architects and design engineers are constantly finding new ways to use Enjay Butyl in building and construction. Its many outstanding qualities —plus its low cost—make it perfect for use in a wide variety of applications. Call or write our nearest office today for a complete list of suppliers.

ENJAY BUTYL

Enjay Butyl is the greatest rubber value in the world. It's the super-durable rubber with *outstanding* resistance to aging • abrasion • tear • chipping • cracking • ozone and corona • chemicals • gases • heat • cold • sunlight • moisture.

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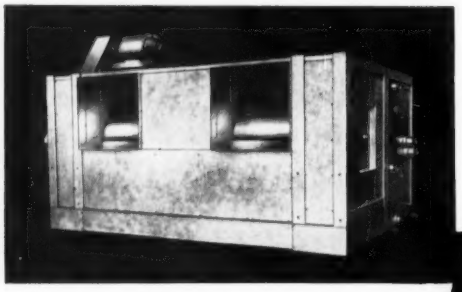
BETTER AIR CONDITIONING FOR EVERYBODY EVERYWHERE

Carrier

Save hours of design time with this one Weathermaker that solves scores of air conditioning problems!

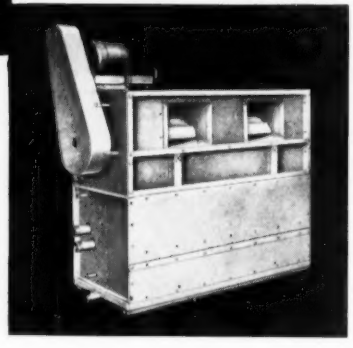
Just study the opposite page for a moment. See how easy it is to tailor the new Carrier 39AC Single-Zone Weathermaker* to your central station air conditioning jobs. "Building-block" flexibility simplifies unit selection and location; enables you to satisfy all system requirements quickly and precisely. Another big timesaver is the new 72-page Carrier Catalog 39ACW-55—so complete it is the only reference you need to use. Chilled water or direct expansion coils may be selected either from entering and leaving conditions or by using apparatus dewpoint. No basic data calculations required. For your copy of the catalog, phone the Carrier office nearest you. Or write Carrier Corporation, Syracuse 1, New York.

*Reg. U.S. Pat. Off.



← Typical horizontal arrangement

Typical vertical arrangement ↓



39AC Single-Zone Weathermakers. For conventional systems. Choice of direct expansion or chilled water cooling coils; steam or hot water heating coils. Eight sizes, from 2400 to 40,750 cfm; coil face velocities from 300 to 700 fpm; static pressures up to 4 inches. Carrier also offers 39W Multi-Zone Weathermakers for simultaneous independent cooling or heating in up to 14 different zones. 8 sizes; same cfm range, coil face velocities and static pressures as 39AC.

THESE BUILDING-BLOCK COMPONENTS FIT TOGETHER IN SCORES OF DIFFERENT WAYS

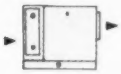
FAN SECTION. This component is the cornerstone of all 39AC arrangements. It provides a choice of discharge directions as well as fan motor locations.

COOLING COIL SECTIONS. Short type assures extreme compactness; standard cooling coil section permits cooling with reheat. Or you may use both coils.

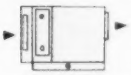
DRIP PANS. Two are available—one long, one short. Note in typical examples below how this choice of pan sizes increases freedom of arrangement.

ACCESSORIES. Over a dozen matching accessories make available every function of year-round air conditioning in one compact central station unit.

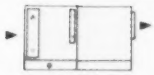
TYPICAL HORIZONTAL ARRANGEMENTS



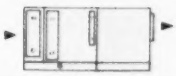
1. Short cooling coil section, fan section and long drip pan. For summer cooling only (DX); or summer cooling and winter heating with water.



2. Auxiliary heating coil section, short cooling coil section, fan section, long drip pan. For summer cooling, winter heating, each with its own coil.

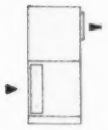


3. Standard cooling coil section fitted with cooling and heating coils, fan section, short drip pan. For summer cooling with reheat, winter heating.

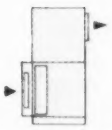


4. Short and standard cooling coil sections, fan section, long drip pan. Extra cooling surface for summer cooling with reheat, winter heating.

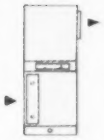
TYPICAL VERTICAL ARRANGEMENTS



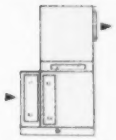
5. Standard cooling coil section, fan section, short drip pan. For summer cooling only (DX); or summer cooling and winter heating with water.



6. Auxiliary heating coil section, standard cooling coil section, fan section, short drip pan. Summer cooling, winter heating, each with its own coil.

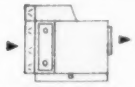


7. Standard cooling coil section, auxiliary heating coil section, fan section, short drip pan. For summer cooling with reheat, winter heating.

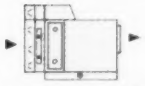


8. Short and standard cooling coil sections, auxiliary heating coil section, long drip pan. Extra cooling surface for same service as Number 7.

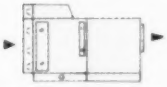
HORIZONTAL (WITH BYPASS)



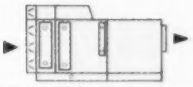
9. Same arrangement and functions as Number 1, but with face and bypass dampers and external duct added to provide this control.



10. Same arrangement and functions as Number 2, but with face and bypass dampers. Note duct permits bypass of both heating, cooling coils.

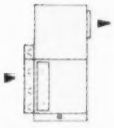


11. Same arrangement and functions as Number 3, but with face and bypass dampers. Duct permits bypass of cooling coil but not heating coil.

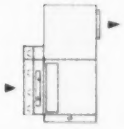


12. Short and standard cooling coil sections, heating coil, long drip pan. Duct permits bypass of cooling coils but not heating coil.

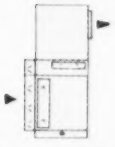
VERTICAL (WITH BYPASS)



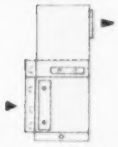
13. Same arrangement and functions as Number 5, but with face and bypass dampers. Note in this setup no external bypass duct is needed.



14. Same arrangement and functions as Number 6. Here a small sheet metal adapter is required to complete the installation of the bypass.

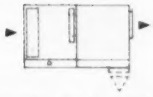


15. Same arrangement and functions as Number 7. Here a special "bypass heating coil section" is required to provide inlet for the bypass air.

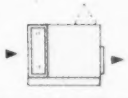


16. Same arrangement and functions as Number 15, except heating and coil position is changed so air will bypass both heating and cooling coils.

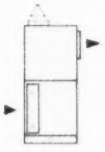
FAN DISCHARGES



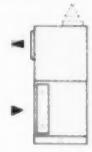
17. Fan section may be rotated about the shaft, or end for end. Drawing here shows top horizontal discharge or alternate downblast.



18. Another variation with short coil section permits either horizontal discharge from bottom of fan section, or alternate true upblast.

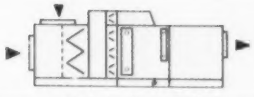


19. Either truly horizontal or truly upward discharges may also be attained with the vertical arrangement of 39AC components, as illustrated.

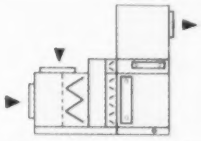


20. In this arrangement of the fan section, the vertical unit provides horizontal discharge and at the same time reverses direction of the air.

ACCESSORIES



21. Typical horizontal arrangement featuring these standard accessories: mixing box assembly with interconnected double acting damper blades and low velocity filters; plenum section; face and bypass damper section and bypass duct assembly. As in all arrangements, spray humidifier section can be inserted ahead of cooling coil.



22. This vertical arrangement features these accessories: mixing box assembly with damper blades and filters; plenum section; face and bypass damper section; auxiliary heating coil section. Note this setup provides full year-round service with excellent control in a package that makes economical use of valuable floor space.

From the Editor's

Tranquil Tower

ON PAGE 33 of the January 1959 issue of *Civil Engineering* there is an article called "Ethics in Public Practice," by R. Robinson Rowe, Principal Bridge Engineer of the California Division of Highways. He starts with the sentence, "The Code of Ethics of the American Society of Civil Engineers is fully as applicable to engineers in public practice (government employees) as it is to those in private practice." Then, he takes up each article in the code, and despite a very sincere attempt to stretch his imagination over and over, he inadvertently proceeds to prove himself wrong.

Anyone who has studied the several codes of ethics adopted by various segments of the engineering profession should find Mr. Rowe's dilemma perfectly understandable. The fact remains that engineers still do not have a universally suitable code of ethics. A code of ethics must be applicable and enforceable, as it is in law and medicine, before it really can have meaning. Take, for example, our most generally accepted code — the Canons of Ethics as drawn up by ECPD and adopted by about 80 engineering societies in this country, including NSPE. While the Canons were many years in development, very few of the 28 sections are actually applicable to most engineers.

An employee-engineer reading the Canons of Ethics would give up before he got through a third of it because he would see that few of the Canons really apply to him. It soon becomes quite clear that almost every section deals with problems primarily of concern to engineers in private practice.

It also is unfortunate, but true, that the Canons of Ethics — and other codes of ethics — are not enforceable. Actually, about the only action that can ever be taken on the Canons or on any society's own code involves suspension from the society. Even this relatively mild action seldom is used.

We believe that engineers will get a more applicable code of ethics if the current codes are separated carefully into those that apply to engineers in private practice and those that apply to employee-engineers. This has no affect on enforcement, however. And it is important that these codes be enforceable if they are to have any real meaning.

One way to handle this would be to make membership in NSPE legally mandatory for all registered engineers. This type of thing is done in some countries, and this is almost the situation we have with regard to bar associations and medical associations. Then, if NSPE were to expel a member for good reason, this would be, to all practical purposes, about the equivalent of having one's registration revoked.

As appealing as this may seem to be as an enforcement weapon, we must face the fact that engineers in this country are by no means ready to accept NSPE or any other society on that basis.

Perhaps the most acceptable substitute would be a joint ethics committee of EJC and NSPE. If such a committee could be formed with a representative from each of the societies in EJC and a representative from NSPE, and if this committee could function with unanimity, then anyone found guilty of ethical misconduct could be simultaneously expelled from all the societies and the associations to which he belonged. This could be quite a severe punishment, certainly for a consulting engineer. If, at one stroke, a consultant were expelled from his Founder Society, his state and national society of professional engineers, and the local association of Consulting Engineers Council, the penalty would not be a small one.

Even this suggestion is not likely to get far, primarily because EJC and NSPE still have not been able to come to any kind of conclusion as to how they can most effectively work together.

These, however are our two recommendations — a separation of the Canons and Codes so as to apply separately to engineers in private practice and employee engineers; and a correlation of ethical practice committees into one unity committee whose decisions could have effect throughout all of the profession.

We have no false hopes concerning the immediate adoption of these suggestions, but we do believe they would work for the great good of the profession as a whole. ▲▲

HONEYWELL ANNOUNCES

the most recent development in centralized temperature control

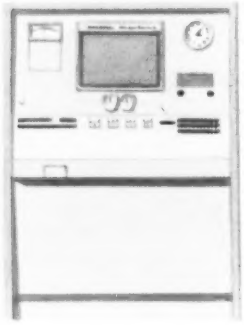
NEW SELECTOGRAPHIC SUPERVISORY DATACENTER*

Honeywell's revolutionary temperature control console features floor plan and system projection. It automatically gives a visual picture of an entire air conditioning system's operations in even the largest buildings.

It provides operating efficiency, better use of specialized manpower, longer equipment life, attractive display of engineering design and more comfortable buildings—all from a standard unit only 4′ wide, 4′ high and 2′ deep.

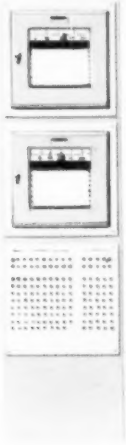
The Selectographic Supervisory DataCenter is a significant advance in a concept pioneered by Honeywell, whose central control panels are now being used in all kinds of buildings: hospitals, banks, schools, theatres, office and industrial buildings, hotels and motels.

*Trademark



CENTRAL SELECTOGRAPHIC PANEL

Replaces system diagrams and floor plans that take up much of the area on present panels. The desired diagram or floor plan is flashed on one screen. At the same time console controls—single set of push buttons—are automatically switched to control the system in view. They provide precision temperature indication, logging and adjustment plus start and stop control of fans and



TEMPERATURE, HUMIDITY RECORDER

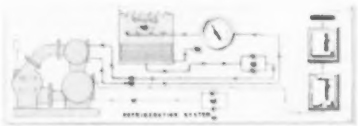
These recorders provide exact printed records of temperatures and humidity throughout the system. These records may be studied to determine over-all system efficiency. Through a plug and jack system one recorder can record up to 20 different measurements on a single chart. Points can be selected so that only those of interest at the

HOW THE SELECTOGRAPHIC WORKS

MODULAR CONSTRUCTION, FLOOR PLAN AND SYSTEM PROJECTION MAKE CENTRALIZED CONTROL EASIER TO DESIGN, INSTALL, OPERATE

Now an air conditioning engineer can "see" up to 50 separate fan system diagrams and floor plans, read and adjust critical temperatures throughout a multi-story building ...all at one small console.

In addition to the Selectographic projection feature, Honeywell's modular *building block* design brings new flexibility, new economy to centralized air conditioning controls. Starting with the basic unit—the central Selectographic Console—other modules of a standard 2′ x 2′ dimension may be added as the need arises or as the budget permits. Honeywell's Selectographic Supervisory DataCenter can be installed in buildings of all sizes, of all purposes—and grow with the structure itself.



REFRIGERATION PANEL All major electrical accessories of refrigeration system can be started and stopped from this panel. Where the systems require it, the chilled water temperature can be controlled by a precision continuous recording controller in the chilled water supply line. A second controller may indicate and record system output in BTU's. The total BTU output is shown on a numerical counter which can be compared to the total electrical input shown on a similar

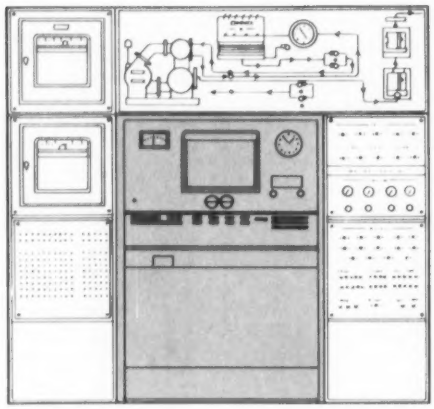
ALARM AND ANNUNCIATOR SECTION

This module contains all air conditioning and refrigeration system alarm pilot lights and equipment operation pilot lights. In addition it may contain cold storage or special climate room limit alarms and other temperature, humidity, flow and pressure monitoring

and stop control of fans and

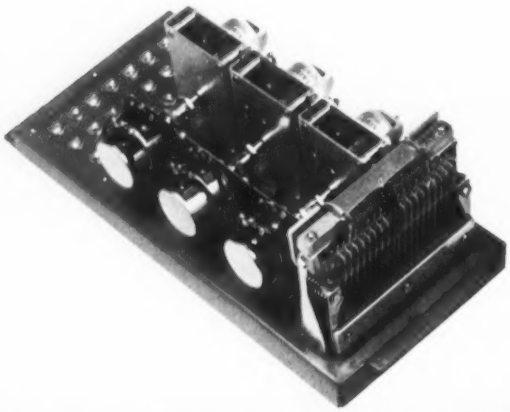
single chart. Points can be selected so that only those of interest at the

HOW THE SELECTOGRAPHIC WORKS



NEW PROJECTION SYSTEM STORES ENTIRE BUILDING'S FLOOR PLAN IN CIRCULAR FILE OF 50 SLIDES READY FOR INSTANT SCANNING

The 50-slide projector is operated by pushing a button. Desired floor plan or system diagram shows on the screen; consoles of push buttons then are automatically switched to control that plan or system. One set of push buttons will cause the temperatures at the check points on the plan to be indicated on the console. Simply pushing the proper increase or decrease button will adjust or reset one or all of the thermostats on the plan except those in private spaces. Pushing a similar set of buttons will start and stop all supply and exhaust fans; another set will position all dampers.



MULTIPLEX UNIT

The ability to control an entire system by one set of buttons is made possible by this Honeywell Multiplexer—a multipole bar relay energized by the same button as the projector. All temperature control points and sensing points are connected through this bar relay to the control buttons on the console. Wiring is simplified and substantially reduced.

MORE THAN 400 CONTROL CENTERS using the basic principles outlined here have given improved operating efficiency, better use of specialized manpower, longer equipment life, operational savings and more comfort to hospitals, schools, hotels, office and industrial buildings, banks, shopping centers and churches. A Honeywell control specialist will be glad to work with architect or engineer even before blueprints are started. At this stage his knowledge will be most useful in designing and installing a system that will give the greatest possible satisfaction to all concerned. For more information send the coupon or call one of the 112 local Honeywell offices across the nation.

CLIP AND MAIL COUPON FOR DETAILED SPECIFICATIONS

Honeywell

H First in Control

HONEYWELL
DEPT. SDC110
MINNEAPOLIS, MINNESOTA

Gentlemen:

Please send me detailed specifications on Honeywell's new Selectographic Supervisory DataCenter.

NAME_____

FIRM_____

POSITION_____

ADDRESS_____

BTU output is shown on a numerical counter which can be compared to the total electrical input shown on a similar

and other temperature, humidity, flow and pressure monitoring

The Readers' Guide

Equipment Leasing

A recent survey of long-term leasing of production equipment by U. S. industry shows that the dollar volume total of leased equipment rose to $227 million in 1958. This is a 26 percent increase over 1957. Consultants should note this rather startling gain in popularity and get detailed information by reading the article "When Should You Recommend Equipment Leasing?," by Clarence C. Kane, vice president of the United States Leasing Corp. Kane points out that the consulting engineer sometimes is faced with a financial dilemma – his client's budget cannot cover the cost of the proposed construction program. The consultant who is well enough versed in the business operations of his client then may be in a position to recommend an equipment leasing program as the best way to obtain the necessary additional capital. With the present squeeze on company working capital in this country not expected to ease in the near future, Kane's article is particularly timely. It starts on page 96.

Fees and Finances

"A Portrait Of The Profession – 1959," based on a survey of consulting engineer firms, continues this month and deals primarily with fees and finance. The charts and tables offer each consulting firm an opportunity to compare its income and operating costs with averages for the profession as a whole. This portion of the survey seems to indicate that consulting engineer services are real bargains at today's prices. Generally speaking, fees are too low to cover today's high operating costs, and it is time that consulting engineers recognized the situation and started charging what they are worth.

Roman Concrete

Giorgio Pellegrini and Emanuele F. Radogna are two young engineering professors at the University of Rome. For the past few years, both have been studying the civil engineering methods and materials of the ancient Romans. As they point out in their article "Concrete Construction In Ancient Rome," starting on page 82, the old Romans made considerable use of concrete in construction, and their cement was of a pretty good quality. It is amazing to realize how much these early builders knew about concrete construction in contrast to the architects and builders of the Middle Ages and right on up to the 19th Century. During all of this, concrete was either unknown or ignored, and it was not until something over a hundred years ago that it was "rediscovered."

Adventure and Romance

Dr. Clayton G. Ball, president of Paul Weir Company, Inc., of Chicago, has written for us a most fascinating account of his recent activities in South Vietnam where he headed a party of engineers exploring a back country area for coal. His article, "We Surveyed For Coal In South Vietnam," starting on page 112, carries one back to the days when mining engineers from this country could be found anywhere in the world opening up new mineral resources. Today, most explorations lack the adventure and romance associated with the mining engineer represented by Hoover and Scott Turner, but Dr. Ball and his group prove that even now mining engineers must go to out-of-the-way places and deal with primitive cultures in their search for minerals and fuels.

"Small" Computers

"Small Computers for Small Firms" should make interesting reading for any consulting engineer considering the possibility of using an electronic computer in his own office. More and more reports, from consultants who have conducted studies, indicate computers are economically feasible for many applications. William A. Briggs, of Burgess & Niple, discusses digital computers costing between $500 and $3000 per month for upkeep, which he classifies as "small." The article, beginning on page 116, includes a resume of presently available "small" computers, how much they cost, and what they can and what they cannot do.

The Word From Washington

EDGAR A. POE
Consulting Engineer Correspondent

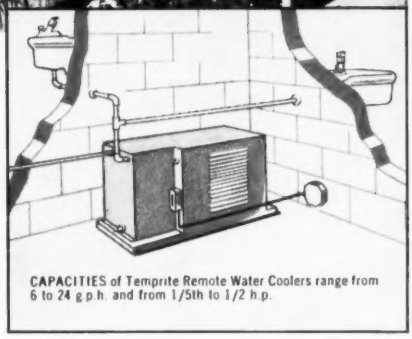
THE MOST IMPORTANT NEWS from Washington this month is the recent decision of the Supreme Court in the Lublin, McGaughy case (see cover story). The majority opinion settles the question of whether or not employees of consulting engineer firms come under the Wage and Hour Provisions of the Fair Labor Standards Act. The court focused its attention on the activities of the nonprofessional employees, not on the business of the employer. It makes no difference, the Court says, whether the firm's practice is itself local. The point at issue is whether the work of these nonprofessional employees puts them in interstate commerce. The court pointed out that the Secretary of Labor's action against Lublin, McGaughy was directed against some 50 draftsmen, fieldmen, clerks, and stenographers. All of these they found to be "engaged in commerce;" the stenographers, for example, "prepared and typed substantial numbers of letters concerning the described projects which were mailed to persons in places other than Virginia and the District of Columbia . . ." The Court further decided that "the preparation of the plans and specifications was directly related to the end products and that the employees whose activities were intimately related to such preparation were 'engaged in commerce.'"

Practically every consulting firm in the country now must accept the fact that its nonprofessional employees are covered by the Wage and Hour Laws. These employees must be paid time and a half for overtime, and records must be kept on wage payments to satisfy the requirements of the law.

It is true that technically this decision affects only the firm of Lublin, McGaughy, but to assume that

Why drinking water at the Jack Tar is Temprite cooled

Remote drinking water coolers by Temprite are ideal for outside areas, such as the swimming pool area adjoining the Jack Tar Hotel in Galveston, Texas. The Remote Cooler can be installed behind building walls or any concealed area, and connected to one or more bubblers located on the outside walls. There's no costly piping and the condensing unit is fully protected from the elements.



CAPACITIES of Temprite Remote Water Coolers range from 6 to 24 g.p.h. and from 1/5th to 1/2 h.p.

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- **LIGHT WEIGHT** – approximately 80% open, reduces dead weight, allows greater live load.
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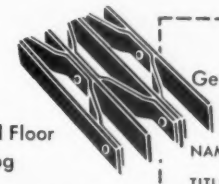

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there can be other decisions in other cases is simply to fail to face the facts. This is it. The Court has ordered.

Urban Planning by BPR

Because more and more states are establishing urban planning sections, the Bureau of Public Roads has set up a new division in its office of engineering. The new BPR division will aid in coordinating urban highway and interstate development with urban master transportation and land use planning. Urban development and redevelopment is consuming tremendous land acreage, and is growing in importance. Economists and engineers in the Federal government now are agreeing in principle with those in private circles that urbanization, which has been under way at an amazing pace since World War II, cannot be stopped. More and more people want to live in urban centers, but they do not want to be crowded. As a result state and local planning boards also are being set up relating to highways, water, traffic, slums, zoning, pollution, schools, factories, and homes.

Science Committee Report

The President's Science Advisory Committee, appointed shortly after the "Sputnik" crisis to look into the status of American science and technology, has issued a report recommending the formation of a new Federal Council for Science and Technology.

The establishment of the new group, which would aim at promoting closer cooperation among Federal agencies in planning programs in science and technology, has been approved by President Eisenhower, who asked that an executive order be prepared to create the new organization "without delay."

The report, which emphasized "technology" and occasionally mentioned "engineering," pointed out that the new Council should:

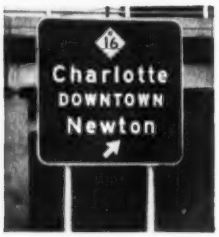
"Consider the level and type of research financed by the private sector of the economy, consulting as appropriate the National Acadamy [sic] of Sciences, the Engineers Joint Council, and the Social Science Research Council in order to ensure, as far as possible, that the public and private efforts are complementary."

The president's committee added, "We do not believe that these recommendations by themselves are more than a beginning . . .

"This year the U. S. Government will spend over $5 billion on research, engineering, and development, substantially more than it spent from 1900-1939 — and more than the total Federal budget of a generation ago.

"If this support is halting and erratic, if it emphasizes mechanism and 'hardware' to the neglect of fundamental understanding, if it lavishes money on a few popular fields and starves others of impor-

"Cuts maintenance to the bone"



PACKAGED SIGNS
SPEED INSTALLATION

To the natural advantage of light weight, Tassco provides these aluminum signs in pre-arranged packages ready for installation. The easy-to-handle panels are assembled on the job site and mounted in a matter of minutes.

TASSCO

This is North Carolina's new Route 85, by-passing cities, moving traffic quickly with the help of a signing program by Tassco. The complete program consists of ground mounted and overhead signs. The signs themselves are increment sheet signs developed by Tassco especially for use on modern, high-speed roads. They can be had in any height or width and are designed to meet 100 mph wind loads. The use of increment sheets means new lows in the cost of both materials and installation. But what is most important, since the State has to bear the costs of maintenance, is that with 1193 signs, 501 sign supports, and with 9 large sign spans, not one drop of paint is required for maintenance.

North Carolina's signs feature the approved reflectorized green background with white AGA letters. However, reflective material or painted backgrounds are available in any type letters or symbols.

Helpful data, including a full color movie, is available from the Tassco-P & K Highway Planning Committee. Write for "Committee Data" today.

TRAFFIC AND STREET SIGN COMPANY
84 FOUNDRY STREET, NEWARK, N.J.

ANOTHER "NAME" HIGHWAY PLAZA WITH STEEL PIPE SNOW MELTING

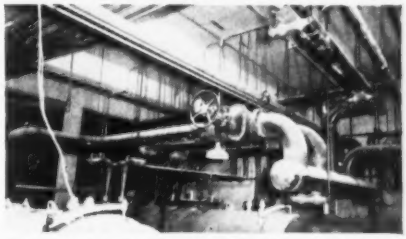
Through the 22 gates of the new Calumet Skyway Toll Bridge, winter traffic will roll with summertime speed and safety thanks to an automatic *steel pipe* snow and ice melting system in the plaza approaches.

This great highway joins with others, such as the Indiana East-West Toll Road, in melting snow as it falls and preventing accumulation of ice by heating the concrete surfaces with hot anti-freeze circulated through embedded grids or coils of *steel pipe*.

For this growing development in highway construction *steel pipe*'s economy and proved reliability make it the logical material. Also, in all types of building construction, as for vent and drainage lines, fire sprinkler systems, hydronic heating, electrical conduit, structural uses, refrigeration, gas, oil and water lines, *steel pipe* is the most widely used pipe in *the* world.

Write for free booklet "Steel Pipe Snow and Ice Removal Systems."

Embedding a total of 76,192 feet of ¾" and 1¼" steel pipe in plaza approaches.



Boilers under plaza supply heat, through heat exchangers, to the circulating liquid.

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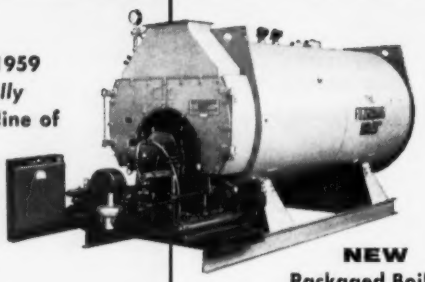

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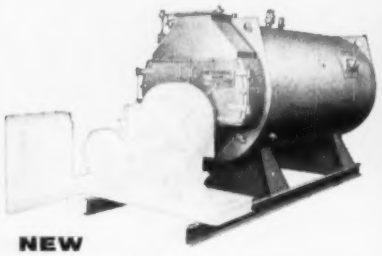

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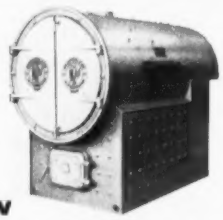

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tance, if it fails to encourage exceptional men and exceptional programs, the net result could be an impoverished science and a second-rate technology."

More World Bank Loans

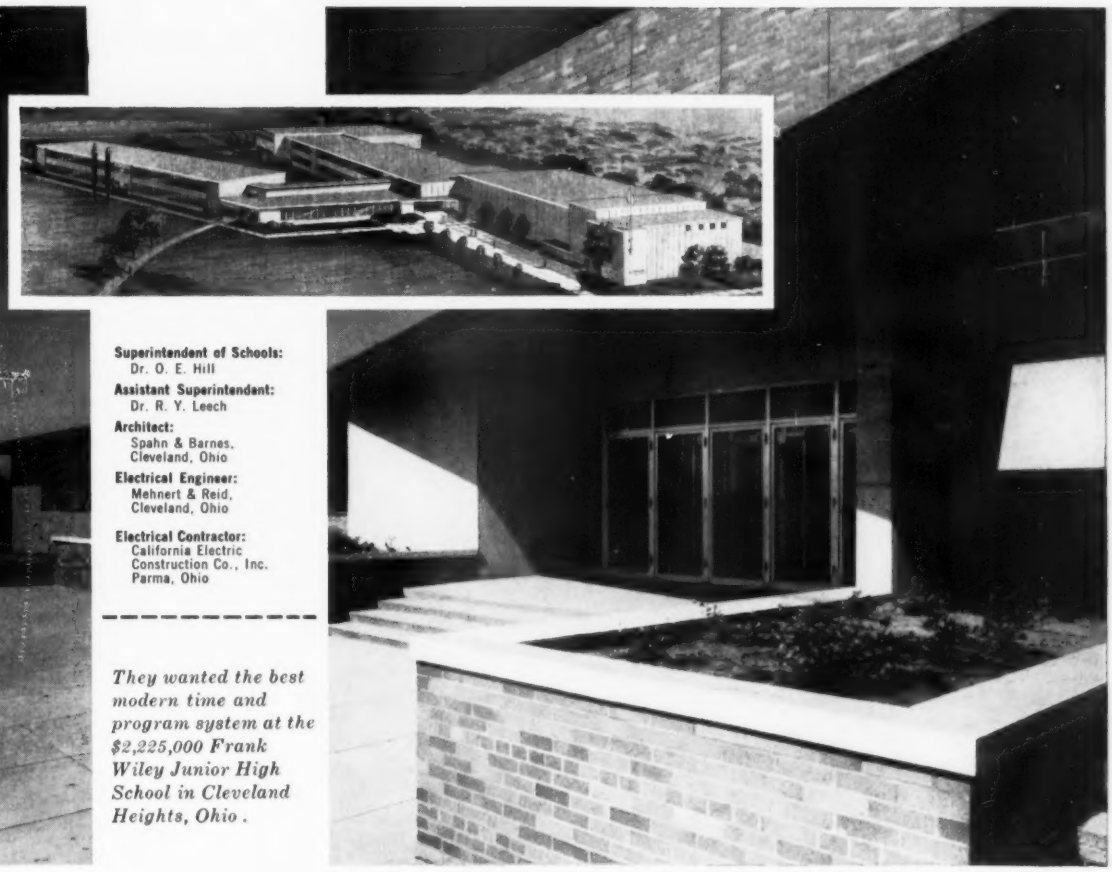
World Bank loans are resulting in more and more consulting engineers going abroad to provide technical assistance in connection with development programs. Thirty loans were made in 1958 to 17 countries. These loans brought the total of World Bank credits for reconstruction and industrial development to more than $4½ billion. Electric power and transportation were the chief purposes of the financing last year. Japan negotiated seven loans totaling $164 million for power and iron and steel industry development. Latin American countries again will be among the leaders in loans for development programs in 1959. India is currently the largest single borrower with 20 loans totaling $507 million.

Development Loans

The State Department's Economic Undersecretary, C. Douglas Dillon, vows that the need for making loans to foreign countries for development is more important than the need for any budget balancing at home. The current fiscal year loan fund is $700 million. He insists that it should be increased to $1 billion. The loan fund is used to extend credit for development projects that banks and investment institutions are unwilling to join in because of certain risks or lending limitations.

Big Construction Year

Officials of the Associated General Contractors of America, a trade association of 7000 contractors, are convinced after a survey that the United States has begun a new era of construction growth. The only major potential construction barrier foreseen for this year is the possibility of a summer steel strike that might slow things down if it were



Superintendent of Schools:
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Assistant Superintendent:
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They wanted the best modern time and program system at the $2,225,000 Frank Wiley Junior High School in Cleveland Heights, Ohio.

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- Jeweled Master Clock movement with automatically wound 72-hour spring power reserve.
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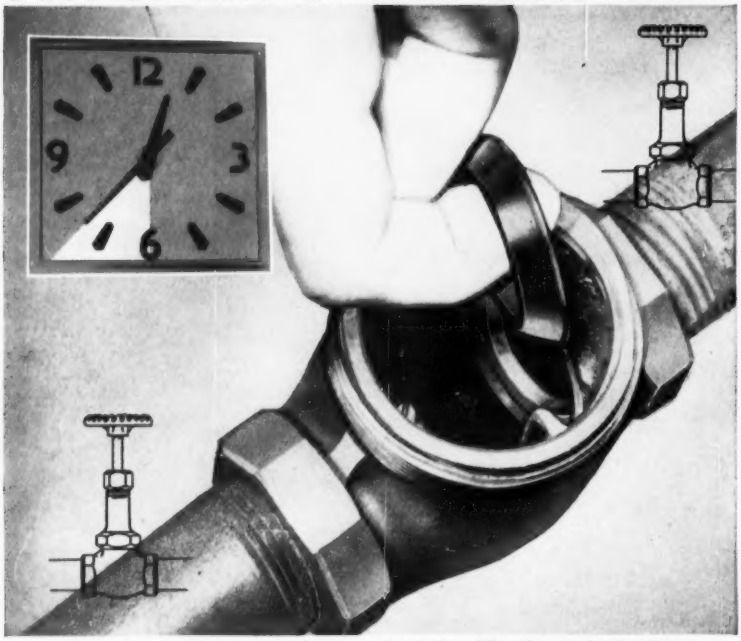
Only 7 to 10 Minutes to Renew Service Life of New Gate Valve



Patented development assures replacement of seat ring while valve remains installed.

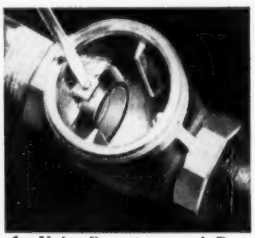
Without removing the valve body from the line, you replace the nickel-alloy seat rings in Fairbanks new patented Renewable Seat Ring Gate Valves. In 7 to 10 minutes, from the time the line is shut down until it is put back into operation, you have given a new service life, a new life of dependable tight closure to your valve.

Just 7 to 10 minutes of your maintenance man's time — only 7 to 10 minutes of "down-time" on your steam, water or process piping lines — and you have the equivalent of a new valve in the line. Think of the savings: where once at least one hour, under the most ideal conditions, was required to replace a gate valve in the line, the job is now accomplished in from 7 to 10 minutes.

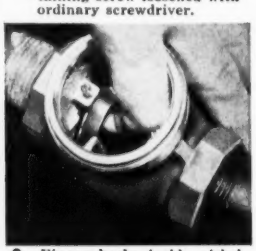
Field tested for over two years, under all conditions from steam to corrosive liquids, the revolutionary new Fairbanks Renewable Seat Ring Bronze Gate Valve has proven completely satisfactory — absolutely dependable.

Made with either rising stem or non-rising stem construction in ½",¾",1", 1¼",1½" and 2" sizes, the Fairbanks Renewable Seat Ring Bronze Gate Valves are recommended for severe service conditions on 200 lb. steam pressure at 550 degrees F., 400 lb. water, oil or gas pressure — non-shock — lines requiring full flow and subject to frequent operation. Nickel alloy seat rings and wedge make the valves particularly tough and corrosion resistant.

YOURS ON REQUEST: Illustrated, descriptive folder gives complete information on Fairbanks Renewable Seat Ring Gate Valve with details and specifications. Yours without charge. Write today.



1. Union Bonnet removed. Retaining screw loosened with ordinary screwdriver.



2. Finger hooks inside nickel alloy seat ring. Seat ring lifts out of valve body.

3. New seat ring is inserted. Retaining screw tightened. Bonnet replaced.

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prolonged. More than one-million tons of steel will be needed for the road building program this calendar year, and the steel industry is looking toward bigger orders for wire mesh, reinforcing rods, culverts, and structural steel. It is estimated that the economic growth in this country within the next 10 years will represent $600 billion worth of new construction.

New Techniques Save Tax Money

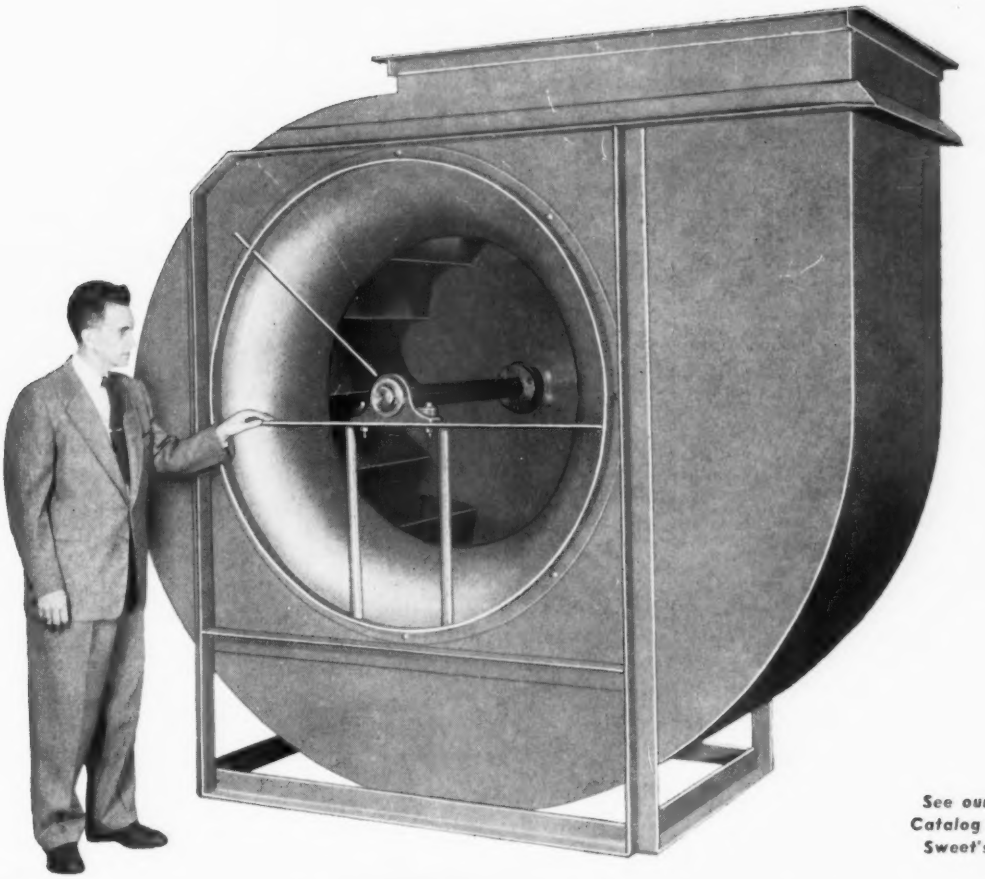
The Bureau of Public Roads asserts that better engineering techniques helped the Bureau to save at least $12 million the past year. The improved methods included greater use of aerial highway rerouting and wider employment of new highway design. One method the Bureau uses to gather its highway statistics is to string tape across the roads from trucks parked at roadside. Electronic machines in the trucks record data on vehicle speeds, travel direction, and lateral positions of cars on the roads.

Flexible Pavement for Airstrips

The Army Engineers have been supported by the House Armed Services Committee in their conclusion that flexible (bituminous) concrete is both feasible and economical for use in noncritical areas of airstrips for the Air Force's heaviest bombers. The House Committee was responsible for the long drawn out research conducted by Army Engineers at Columbus, Miss., after a scrap developed over the relative merits of asphalt vs. concrete pavement.

Federal Power Projects

The nation's privately owned electric utilities, fighting stepped-up public power expansion for many years, may have a major battle on their hands in the 86th Congress. In the past two decades Federal ownership of electric power facilities has risen from less than 2 percent to more than 17 percent of the total in this country, and now the Tennessee Valley Authority,



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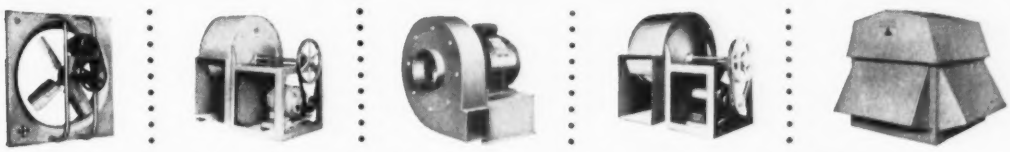

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- Editor: HAROLD A. BOLZ
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USE OF AUTOMATION in materials handling is clearly explained, with suggestions that may lead to tremendous operating economies. How-to-do-it illustrations support the clear-cut recommendations for choosing equipment, timing and coordinating job movements, production control, etc. Text and illustrations reflect the entire literature of the subject — arranged for instant reference.

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seeking permission to finance new power facilities through the sale of revenue bonds up to $750 million, appears to have a good chance of getting legislation passed. At the same time it is felt that certain proposals that the private companies would like to see passed have been weakened, including an amendment to the Holding Company Act that would permit two or more companies jointly to undertake hydro or atomic energy projects.

Highway Program Progress

Federal Highway Administrator Bertram D. Tallamy says the highway construction program this year will be the greatest in history. And, he says the engineering shortage is over. He expressed confidence that there will be simultaneous completion of the interstate system in the various states despite some existing disparities. Approximately 4000 miles of the projected 41,000 mile interstate system now are under contract.

New E & O Rates

The revised rate schedule and policy for Fidelity and Casualty professional liability insurance has received the approval of 39 states (including Alaska).

A check early in the year showed that the revised rates and policy still had not received official sanction in Iowa, Kansas, Kentucky, Massachusetts, Michigan, New Jersey, New York, North Carolina, Rhode Island, and Tennessee.

Nuclear Progress

The Atomic Industrial Forum reports that during 1958 the United States completed 37 nuclear reactors and began construction on a total of 45 more.

Among the power reactors now being built are:

¶ A 75,000 kw sodium graphite reactor for Consumers Public Power District of Nebraska. Unit is scheduled for completion at Hallam, Nebraska in 1960.

¶ A 22,000 kw boiling water reactor plant – including conventional superheat – for operation by the Rural Cooperative Power Association of Elk River, Minnesota. Completion date also is set for 1960.

Completed in 1958 were the nuclear engines for the submarines Sargo and Swordfish; a dual-reactor prototype of a large surface vessel atomic power plant; and an experimental ground test reactor, Kiwi-A, for nuclear rocket studies.

New bilateral agreements were also set up last year between the U.S. and three other nations – Venezuela, Japan, and Cuba – making possible power reactor sales by American industrial firms. This country now has entered into research agreements with 27 nations.

During 1958, Kentucky established an office of nuclear information with a director serving as state coordinator of atomic energy, bringing the total number of states having an individual assigned to coordination of atomic energy at the state level to twelve.

Computer Conversation

With consulting engineers and state highway departments using a dozen different types of computers, the Bureau of Roads has devised a "universal language" with which engineers can talk to any of them. Heretofore, language that was clear to one make or model was foreign to another. The Bureau has established a unique library. Each book in it is a primer on the solution of a particular problem.

For example, one volume presents the results of months of work put in by a highway engineer in Illinois to direct a machine in calculating the quantities of earth necessary to be moved to build a roadway link. Another engineer tackling a similar problem in Tennessee receives a copy of the translated program, codes the instructions for the computer in his office, adds the dimensions and other particulars of his own specific project, and lets the computer do the routine mathematics. ▲▲

4-D

WROUGHT IRON PIPE

SOIL WASTE VENTS DOWN-SPOUTS

4-D represents the most significant development in the history of wrought iron metallurgy. It was achieved by substantially increasing the deoxidation of the base metal, slightly increasing the phosphorous content and using a more siliceous iron silicate. Result is increased corrosion resistance, improved physical and mechanical properties.

Combats Corrosion

4-D Wrought Iron Pipe is an aggressive deterrent to corrosion failures in drainage systems. The permanence and durability of 4-D Wrought Iron Pipe increase the value of any building. 4-D's piping permanence is especially important where inaccessibility makes replacement and repair a major expenditure for the owner.

Saves Space

To save space, many consulting engineers favor Durham Systems with 4-D Wrought Iron. Such systems eliminate weak and bulky lead-wiped joints, and enable longer runs without damage from building settlement, vibration, or wide temperature variations. And 4-D Wrought Iron Pipe meets building code requirements.

Installs Easily

4-D's availability in long random lengths results in fewer joints, fewer supports, and less labor costs. And there's less weight involved with 4-D Wrought Iron Pipe. When corrosion resistance and strength are factors, 4-D's cost story is easier to substantiate than that of clog-prone, extra-heavy piping materials.

Outlasts Ordinary Metals

Ultimate service life of any piping material in any piping service depends upon its quality and its composition. Thousands of non-rusting iron silicate fibers, uniformly distributed in a highly refined base metal, make 4-D unique in its ability to resist corrosion. There's nothing finer. There's no "or equal." And due to its microscopically rougher surface, which is accentuated by pickling, 4-D Wrought Iron takes up to a 50% tighter, heavier galvanized coating than other metals.

Need proof? Write for 4-D Wrought Iron literature and test results. A. M. Byers Company, Clark Building, Pittsburgh 22, Pennsylvania.

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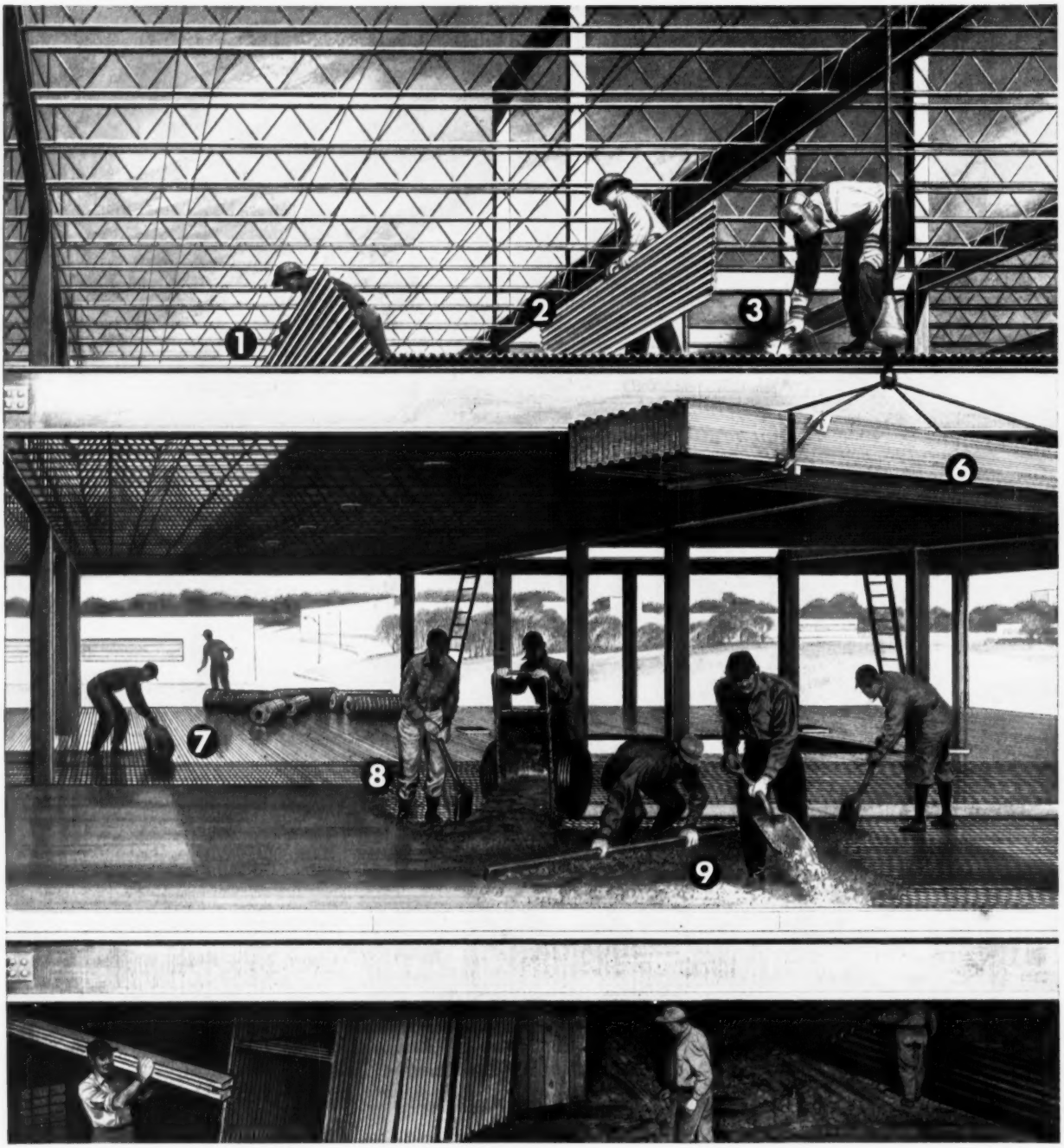

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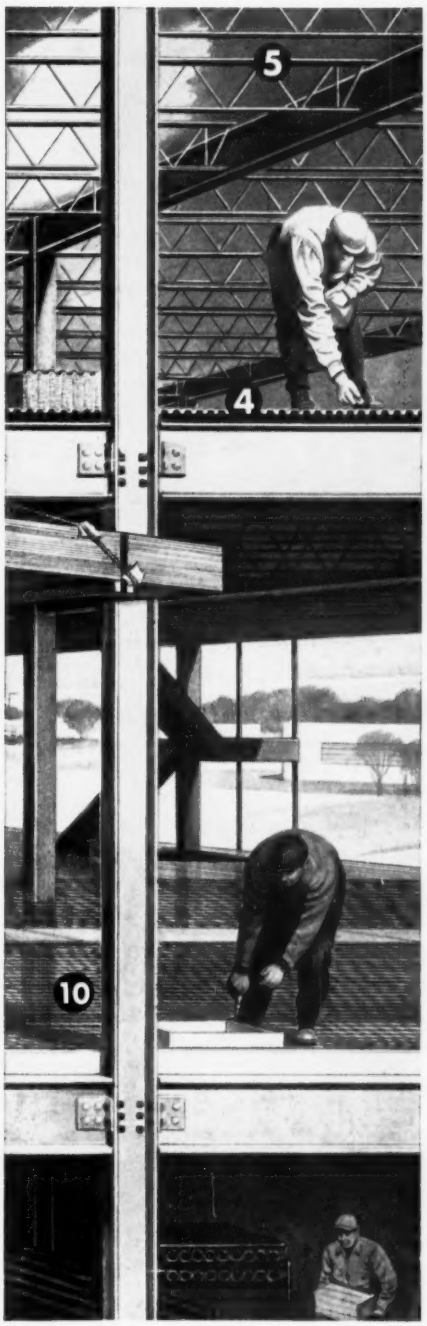
6. **WIDE RANGE** of gages. Use Corruform or Tufcor for spans up to 8'.
7. **SELECT PROPER MESH** for your slab and span design. Corruform gives you a choice!

Corruform® floor slab base delivers all three!



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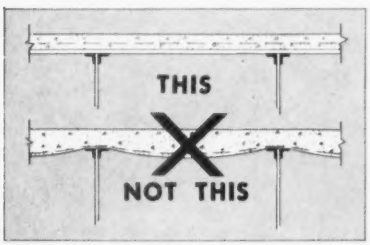
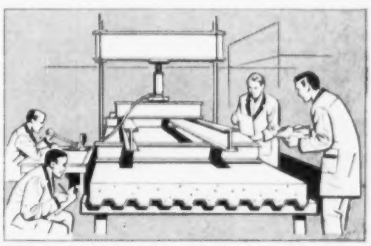
NO FIRES! Corruform and *all* other materials used in this floor system are non-combustible. No paper or other inflammable materials. No danger to men or materials on the job.

GREATER STRENGTH! Corruform is 100,000 psi, tough-temper steel. In place, sheets provide an immediate, safe working platform, take normal abuse. No dents, tearing or punctures!



NO WASTED CONCRETE! Rigid Corruform sheets form a tight solid base, save 20% or more in concrete over "flexible type" centerings. No sacrifice in slab design.



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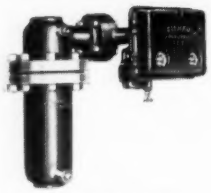
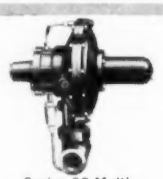


Series 2500-249 and 2500-259B Level-Trols

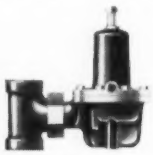
Type 95-H Pressure Reducing Valve

Type 630 "Big Joe" Field Regulator

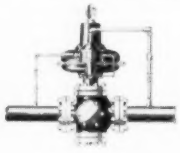


Series 99 Multi-Purpose Gas Regulators

Type 655-A Pressure Regulator



Series 620 and 621 Farm Tap Regulators



Series 298T Gas Regulators

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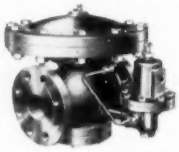

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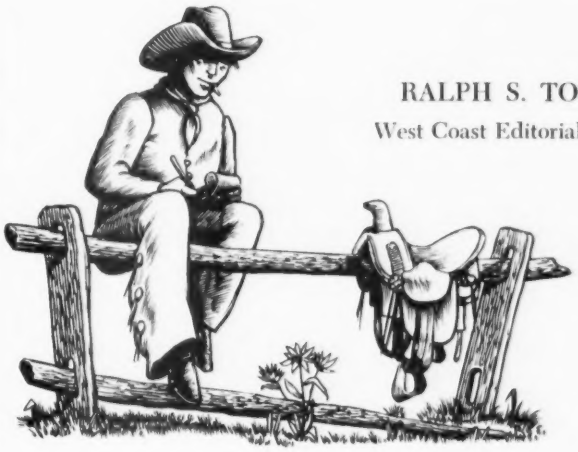


RALPH S. TORGERSON
West Coast Editorial Representative

Report from the West Coast

A TRIP TO THE Pacific Northwest revealed some interesting information concerning competitive bidding, legislative problems, and a recent survey covering costs, fees, and practices of the consulting engineering profession.

Legislative Victory

Engineers and architects in Oregon recently won an important concession from the State's Department of Finance and Administration, which was attempting to impose a regulation requiring competitive bids for professional services.

The original Bulletin 22, issued September 29, 1958 by the Department, required all government agencies to receive competitive bids for architectural and engineering services. The Oregon Technical Council, representing eleven different professional and scientific societies, sent a letter to the Governor through Rowland S. Rosé, president, listing objections to the new regulations. These objections were: failing to differentiate between personal and professional services and endeavoring to apply the same rules of procurement to both; defining professional and personal services in the same paragraph; exempting legal services without quoting law authorizing such action; including only medical services as exempt from bidding; requiring architects and engineers to submit cost of preparing plans and specifications (bidding); and including provisions for setting up a State Department of Architecture.

The Governor replied to the Council's letter, advising that no portion of the bulletin was meant to be in conflict with the ethical practice of any professional group. This was followed by a meeting of the Council and the AIA with the Governor and Director of Finance and Administration. The Consulting Engineers Association of Oregon and the Professional Engineers of Oregon also sent letters to the Governor stating their objections to the original bulletin.

As a result of these representations, a revised Bulletin 22 was issued which largely eliminated objections to the regulations.

Paragraph VII of the revised bulletin now reads:

"The practices of certain professions, such as engineers, architects, and certified public accountants, preclude the use of competitive bidding in obtaining their serv-

ices. It is a common practice, however, for individuals or firms engaged in such professions to submit written statements of experience, ability to perform, and interest in specific jobs.

"In cases where the use of competitive bids is precluded by the ethics of the profession involved, contracts will be negotiated on the basis of investigation and evaluation of available firms or individuals. A minimum of three statements from firms or individuals must be considered in all cases where bids are not obtainable except that, under unusual circumstances, the Department may approve a special request to negotiate a contract on the basis of consideration of only one firm or individual if it is clearly demonstrated that the services of only one recognized authority in a particular field will serve the best interests of the State.

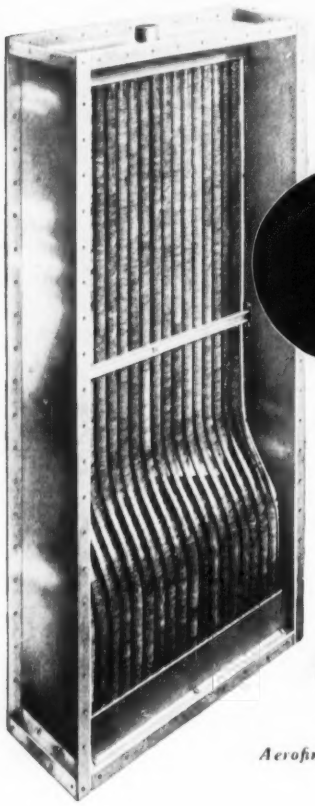
"Statements obtained must contain the following minimum data:
¶ A resumé of the experience of the individual or firm in completing the type of work required,
¶ The quantity and quality of professional personnel available,
¶ A program and schedule for completing the work required."

December CEAO Meeting

The December meeting of the Consulting Engineers Association of Oregon was held at Corvallis, where the association president, Holly E. Cornell, of Cornell, Howland, Hayes and Merryfield, has his headquarters. Preceding the evening dinner and meeting, the members were invited to an open house where small groups were taken on a tour of the modern office building devoted entirely to this firm's operations. The tour proved to be a very popular and worthwhile feature of the meeting, as it offered an opportunity to exchange ideas on efficient engineering office procedures. This firm, for example, prints all its own engineering reports, studies, and office forms. Although the cost of printing these reports is about the same as if the work were done in commercial plants, the convenience and speed represent desirable advantages.

Survey of Operating Costs

The Oregon association has prepared a Fees and Services Handbook which will provide a valuable guide to its membership. Another step in helping engineers toward a more profitable fee structure is a survey on operating costs which was presented by Robert M. Bonney. The survey was broken down into 17 items of cost. Total base salary cost included productive salaries (as a unit of 1.00); nonproductive salaries; and holidays, vacations, and sick leave. Payroll taxes, insurance, and other miscellaneous benefits then were added to obtain the direct payroll cost or an average of 1.486. To this direct payroll cost, there are added 11 items covering outside consulting services, engineering materials, of-



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The right ratio of surfaces—the right materials—the right velocities—the right proportion between coil area and depth . . . there are dozens of factors that affect the efficiency, maintenance and service life of heat-exchange coils.

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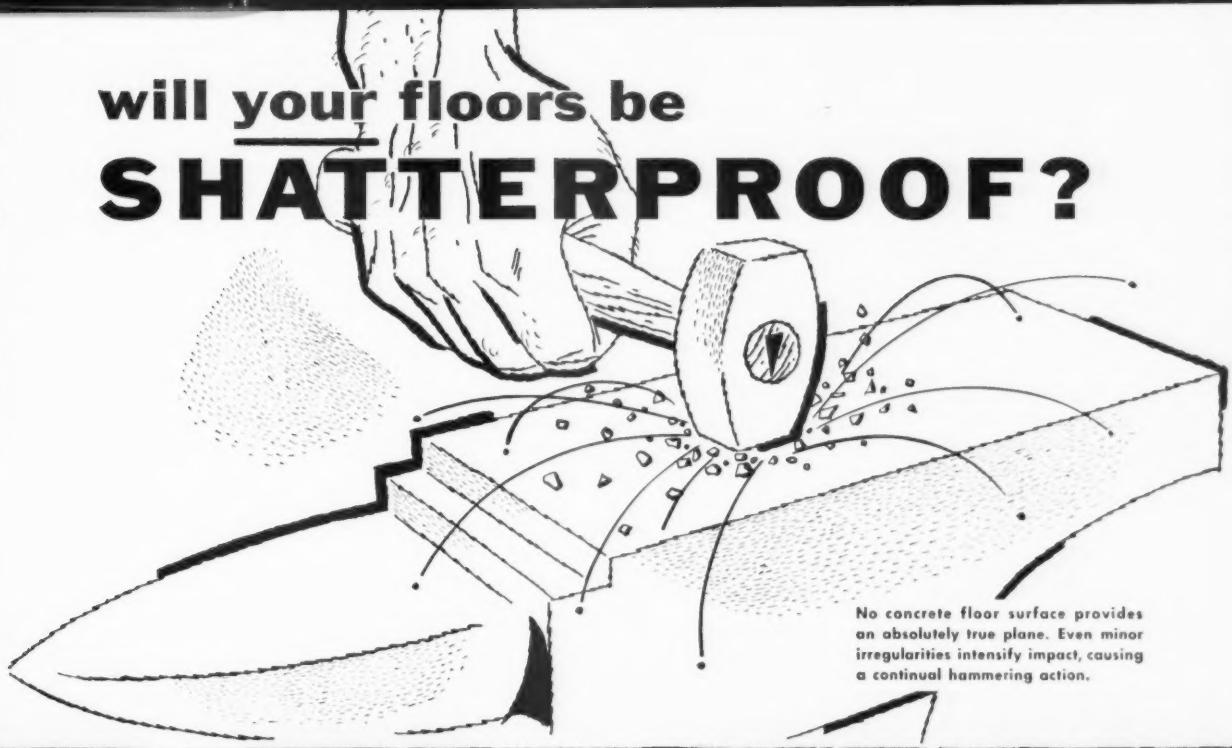
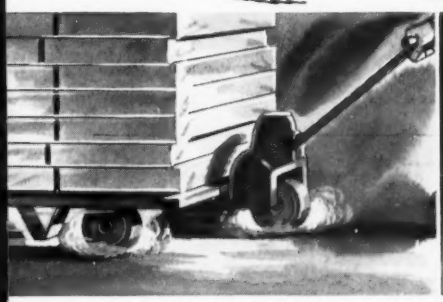
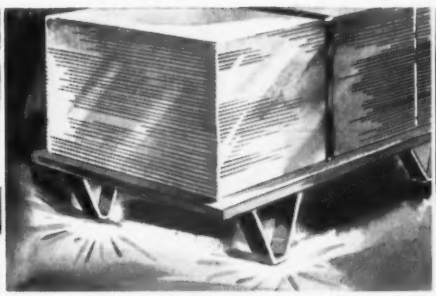


No concrete floor surface provides an absolutely true plane. Even minor irregularities intensify impact, causing a continual hammering action.





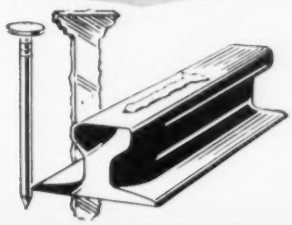
Hard aggregates do not necessarily make long-life floors. Many aggregates—even traprock, granite and emery—are unfortunately brittle. Impact from truck wheels, pallets and skids, and falling objects can shatter these brittle materials, produce ravelling, and start a chain of costly floor maintenance.

Masterplate metallic aggregate is tough yet ductile. The scientifically graded iron particles cushion impact, prevent ravelling and provide the highest abrasion resistance*.

Many million square feet of Masterplate floors are in use today and giving excellent service. Masterplate floors are virtually non-absorbent, oil proof and resistant to many corrosives found in industry.

Full information on Masterplate and "see-for-yourself" demonstration kit on request.

*In U. S. National Bureau of Standards Tests the Masterplate type floor had 6 times greater resistance to wear than the best plain concrete floor.



Basic principle of MASTERPLATE

You know what happens to a nail on the railroad track—it doesn't fracture or crumble; it merely flattens, retaining the same general shape. This is the basic principle of Masterplate. Because of its ductility, Masterplate, unlike brittle material, "gives" under impact, producing a floor with great wear resistance.

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fice costs, transportation, taxes other than payroll and income, and other items that make up the total cost of operation. The composite totals for all survey returns showed a maximum of 2.78, a minimum of 1.51, and an average of 1.89.

As the information was based largely on 1957 costs, the figures do not show the new increase in payroll taxes. Reimbursable expenses were not considered in the survey, but apparently some misunderstanding arose on this point. Transportation costs, for example, could vary considerably, as some companies' operations spread into several states including Alaska, whereas others confine operations to a relatively local area.

Chet Kershaw suggested that the information might be recompiled to show any marked variation between large and small firms.

The CEAO Fees and Services Committee also made a comparative fee study including 16 states and the Gulf area. This study showed that nine states equaled Oregon fees, two were less, and six had higher fees.

Washington Problems

With the legislature convening in January, the Consulting Engineers Association of Washington is faced with the problem of demands for legislation permitting incorporation of engineering firms. Present laws do not permit the practice of engineering by corporations, except on the part of industry in the design of its own products. The law has not been observed to the letter, and there have been a number of instances in which the law has been openly violated. The present law is difficult to enforce, and the State itself occasionally has retained incorporated engineering firms with headquarters outside of the State.

At a special meeting of CEAW on December 11, Harold H. Waller, chairman of the legislative committee, reviewed a proposed draft of revisions to the Professional Engineers Registration Act. The principal bone of contention involves amendments that would permit corporations to practice engineering. Main objection is to the provision that only one member of the firm practicing in the State would be required to be a registered engineer. The subsection reads:

"Such corporation shall have filed with the board a certified copy of a resolution of the board of directors of the corporation which shall designate a person holding a certificate of registration under this Chapter as responsible for the practice of engineering by said corporation in this State and shall provide that full authority to make all final engineering decisions on behalf of said corporation with respect to work performed by the corporation in this State shall be granted and delegated by the board of directors to the person so designated in said resolution."

The draft of revisions offering this amendment was prepared by

Shown above is the beautiful Derby Junior High School (indoor-outdoor) Pool, Birmingham, Michigan which uses an Adams 1-SPF-169 filter to handle the 108,000 gallons capacity. Eberle M. Smith Associates, Inc., Detroit, Michigan was the Architectural Engineer.

Adams SPF swimming pool filters are available in sizes from 5½ to more than 1000 square feet of filter area. Normally all sizes can be shipped from stock. A typical unit is shown at the right.

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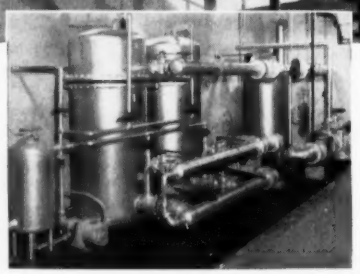

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Complete details are furnished in our new technical Bulletin 626. This bulletin was prepared with you specifically in mind. Why not write today . . . on your letterhead, please . . . and we will send it to you promptly? Your client deserves the best you can specify.

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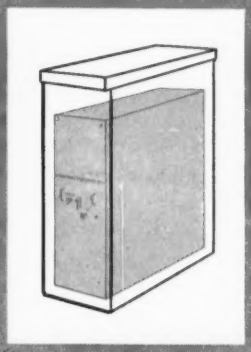
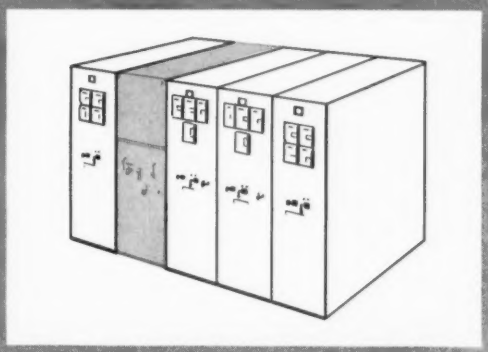
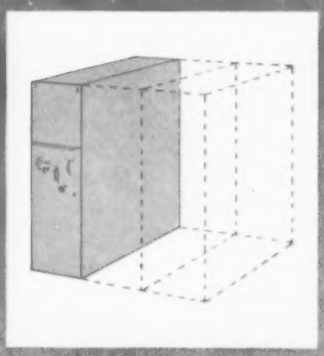


indoor or outdoor units



line-up with G-E Metal-clad



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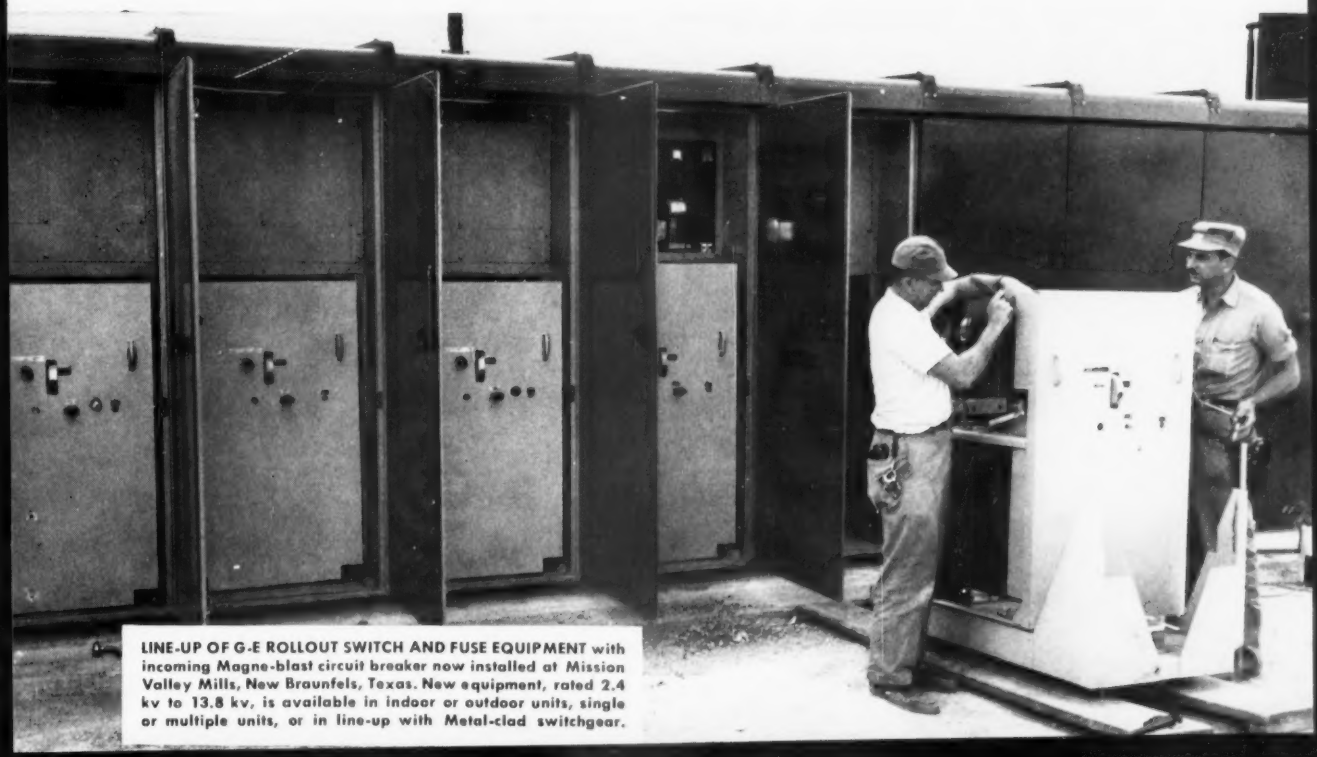

LINE-UP OF G-E ROLLOUT SWITCH AND FUSE EQUIPMENT with incoming Magne-blast circuit breaker now installed at Mission Valley Mills, New Braunfels, Texas. New equipment, rated 2.4 kv to 13.8 kv, is available in indoor or outdoor units, single or multiple units, or in line-up with Metal-clad switchgear.

a small special committee of the Washington Society of Professional Engineers and representatives of the Committee on Engineering Laws. CEAW and the Puget Sound Engineering Council were not invited to participate in the preparation of this draft.

CEAW Viewpoint

Objection is raised to this amendment as it would open the door to contractors, real estate firms, and others to practice engineering by merely including a registered engineer on the staff. CEAW would favor the practice of engineering by corporations only if the majority of directors and the executive head of any firm operating in the State of Washington all were registered professional engineers.

The same amendment governing the practice of engineering in this State by a partnership provides "that a majority of the members of the partnership are engineers or architects duly certificated by the State of Washington or by a state, territory, possession, district, or foreign country meeting the reciprocal provisions . . . "

It is the contention of CEAW that corporations practicing engineering should conform to at least the same requirements as partnerships. Efforts are being made to bring together both sides of the question to see if an agreement on legislation can be obtained.

Procedure for Loaning Employees

CEAW has taken steps to set up a recommended procedure for loaning employees. The procedure covers situations where a firm temporarily does not have sufficient work to keep its employees on the payroll as part of its organization for future work. At the same time another firm may have a rush job and would like to borrow qualified engineers or draftsmen for a relatively short period. The procedure sets up a standard wherein the borrowing firm would call other firms to state their needs and to determine if it would be possible to borrow qualified personnel. Then if two firms can reach an agreement the following conditions would prevail:

¶ The employee would remain on the payroll of the lending firm and receive all rights and benefits normally accorded him at his own firm even though he would be working in another firm's office.

¶ The employee loaned to another firm would be able to maintain his same working time and working hours (based on a 40-hour week).

¶ The lending firm would invoice the borrowing firm on the basis of the employee's actual pay (before deductions) plus 26 percent for straight time.

¶ Overtime (more than 40 hours per week) would be invoiced on the basis of base pay plus 50 percent of base pay plus 26 percent of the base pay.

¶ If an employee is sick, late for work, or takes time off for holidays or for other reasons such time off

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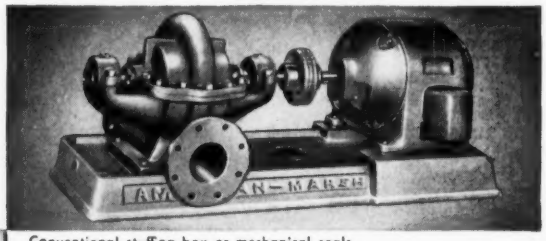
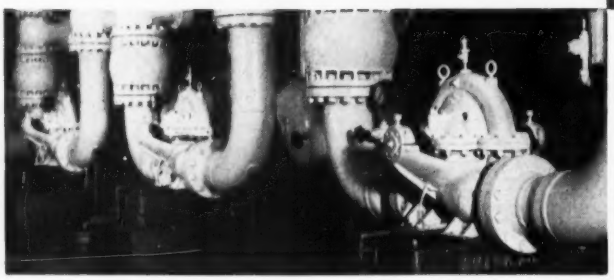


Conventional stuffing box or mechanical seals.



Above — Three bronze-fitted American-Marsh Centrifugals, with direct drive 150 HP motors, each circulate up to 2,000 GPM of chilled water in air conditioning system.

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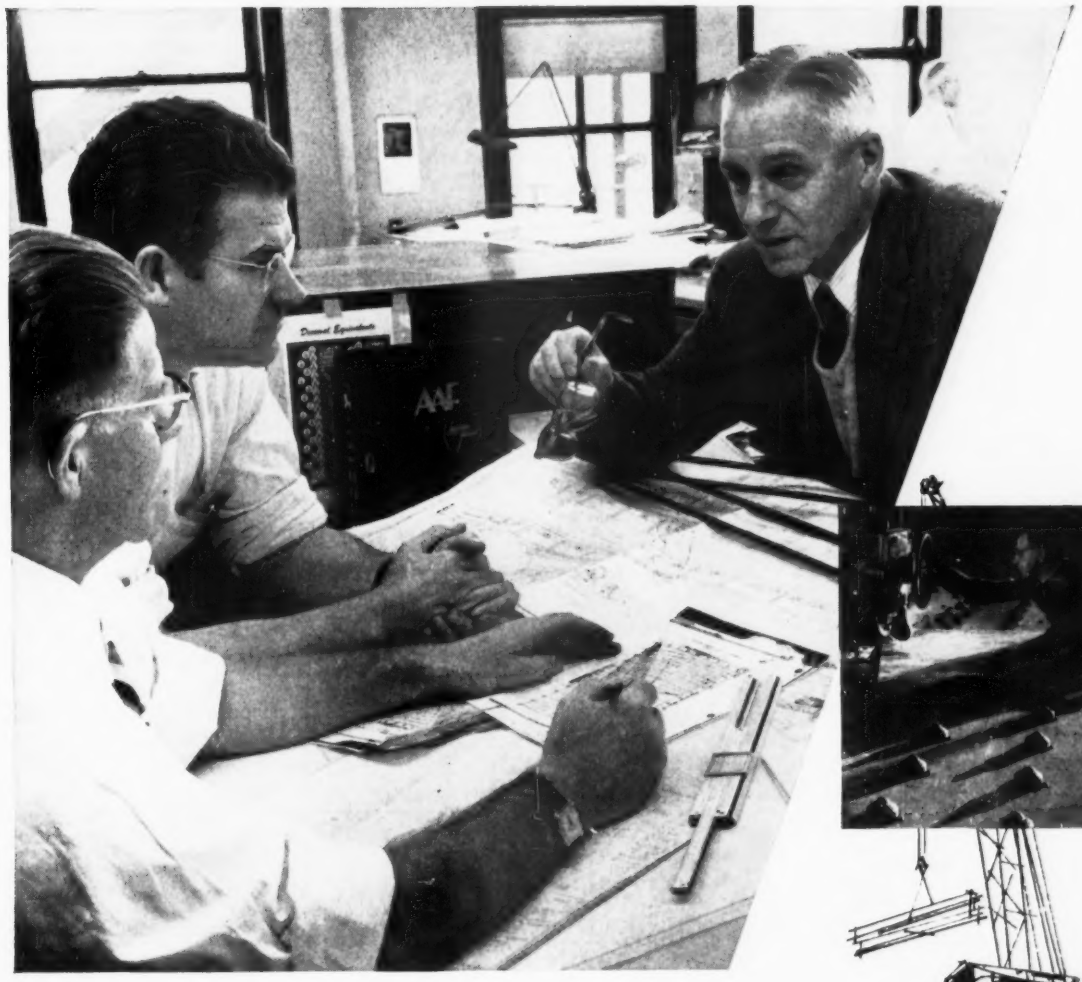

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shall not be charged against the borrowing firm.

¶ The borrowing firm shall give three days' notice to the lending firm prior to the termination of a borrowed employee.

¶ The lending firm has the option of obtaining the return of an employee upon 10 days' notice.

¶ The borrowing firm agrees that under no circumstances will it use any methods whatsoever to interest the borrowed employee to become part of its organization.

¶ Other conditions such as a minimum or maximum time for the borrowing period may be established as mutually agreed upon between the lender and the borrower.

¶ In any disputes, the Board of Directors of the Consulting Engineers Association of Washington would act as arbitrators.

Another rule of procedure was set up by CEAW to cover grievances between members. The rule outlines the methods for submission of grievances to the Board of Directors, processing, and the action to be taken by the Board.

Plan and Specification Charges

Two other recommendations governing charges for plans and specifications were approved by CEAW.

One procedure applies in cases where the consulting engineer issues the plans and specifications:

¶ Five sets of the plans and specifications will be furnished the client at no charge (to be used as designated by the owner).

¶ The client will be charged for all additional sets of plans and specifications required prior to the date of receiving bids. This charge shall be the actual reproduction cost.

¶ Plans and specifications required to be submitted to various approving agencies will be charged to the client at actual cost.

The second procedure is recommended for plan deposits:

¶ A deposit shall be required for all plans and specifications prior to the date of receiving bids.

¶ The amount of plan deposit shall be the cost of the plans and specifications plus 50 percent (in round figures) but in no case less than $5.00. The deposit for extra sets of plans and specifications shall be the same as for the first set.

¶ Material and equipment firms may purchase the specifications and/or separate drawings at cost plus 200 percent. No refund.

¶ All plans shall be returned to the engineer in good condition within 10 days after receiving bids. The amount of plan deposit to be refunded for plans returned in good condition shall be as follows: to bidders – 100 percent refund for first set of plans, no refund for extra sets; and to nonbidders – 50 percent for first set of plans, no refund for extra sets.

¶ Plans and specifications for review may be loaned to such offices as the AGC without deposit.

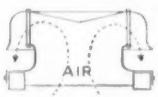
¶ The successful bidder will get as many sets as he may reasonably require at no charge. ▲▲

New low silhouette all-aluminum ventilators

COOK VENTILATORS
The Label of Quality

TYPE PR Pressure Relief Ventilator. Capacities: From 28.28 to 1866.5 sq. in. throat areas.

FEATURES:



All-aluminum construction. Inverted cone eliminates air turbulence. Can be used as air intake, in some cases.

MEMBER: **AMCA** (Air Moving and Conditioning Association)

TYPE QD Direct-Drive Propeller Ventilator. Capacities: From 1200 to 38,350 cfm.

FEATURES:

All-aluminum construction, including propeller. Individually cast hub and blades. For larger volume air movement, particularly in factories and warehouses.

TYPE QL Belt-Drive Propeller Ventilator. Capacities: From 2960 to 18,570 cfm.

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All-aluminum construction. Propeller has stamped deep-pitched aluminum blades. Very quiet—suitable for offices, auditoriums, schools, etc.

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See our condensed catalog 20c/CO in Sweets Architectural File and in Engineers Product File.

Write for free 20-page booklet, "Ideas for Moving Air". Contains helpful information and lists the entire Cook line.

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Says Maintenance Foreman of large gas processing plant.

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This new product of W-K-M's *Creative Engineering* has been service-proved with these ladings.

Acetate Crude ammonia liquor Aviation fuel and Stoddard solvent Propane Toluol Methylethylketone (MEK) Alkaline slurry Jet engine fuel (test cells) Naphtha and coal tar solvents Paint cleaner and thinner Liquid soaps, DDT and chlordane Vinyl chloride Butadiene liquid Copper ammonium acetate Carbon bisulphide Cleaning naphtha Lime and soda ash slurry Riboflavin media Gasoline (tank truck) Helium gas Coke oven by-product gas Gasoline (tank car) Chlorinated solvents.

For 3½ years, users tested this new valve in the hardest services that could be found.

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This valve will deliver promised performance; you can specify it with complete confidence in its efficiency, economy, ease of operation and maintenance.

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AVAILABLE in carbon steel (ASA 150 lb., 300 lb.), and semi-steel (200 lb. WOG, 400 lb. WOG); sizes range from ½" through 6". Also ASA 600 lb., sizes ½, ¾ and 1".

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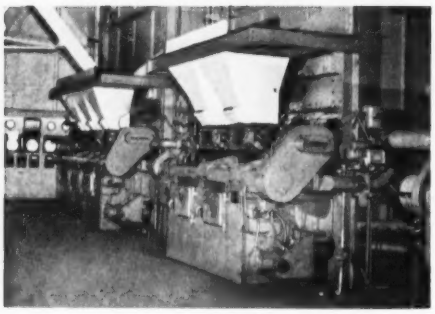
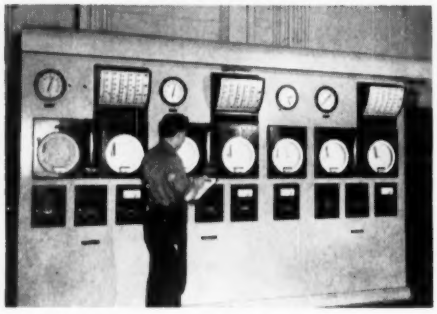


Shown are two of the three Keeler boilers— fired by Detroit Spreader Stokers— in the power plant. At the right is the 22,000 lb/hr boiler. In the background is one of the 50,000 lb/hr boilers. The two sizes allow flexibility in operation for widely varying load requirements.



Control panel by Hays Corporation. This system regulates all operations of the boilers—steam pressure, draft, flue gas temperature, banking periods etc.—to give complete, automatic control of steam generating operation.

Ash disposal system, by United Conveyor Co., in basement of boiler room. Ash is removed from furnace by Detroit CC grate, and is taken by vacuum to silo.

(tank car) Chlorinated solvents.

Telephone manufacturer calls for coal

Automatic Electric Co. burns coal in new plant because of cost and availability

Modern facilities, modern products, modern fuel—you'll find all three at the new Northlake, Ill., plant of Automatic Electric Co., manufacturing subsidiary of General Telephone. The power house of this communications equipment plant (designed and built by The Austin Company of Cleveland) is as modern and efficient as the manufacturing process itself. The plant required large quantities of economically and reliably produced steam for process work and heating. The fuel selected was *coal*, because of coal's economy and abundant supply. As a result, today Automatic Electric enjoys dependable, low-cost steam.

Coal is lowest-cost fuel

Today, when the annual cost of fuel often equals the original cost of the boilers, you should know that bituminous coal is the lowest-cost fuel in most industrial areas. And modern coal-burning equipment gives you 15% to 50% *more* steam per dollar, while automatic operation trims labor costs and eliminates smoke problems. What's more, tremendous coal reserves and mechanized mining procedures assure you a constantly plentiful supply of coal at stable prices.

Technical advisory service

All companies planning a new power plant, or the remodeling of a present one, should consult an engineering firm on its design and construction. As a matter of fact, every Bituminous Coal Institute advertisement advises its readers to take this step. When you have such a project, our Engineering Staff will be glad to assist you in your fuel cost survey with any coal information you may require.

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Exterior view of Automatic Electric power plant. Coal drops into track hoppers; then Stephens-Adamson conveyors move it up into coal silos. Silos have 5-carload capacity.

SEND COUPON FOR NEW "Guide Specifications for Underfeed Stoker Fired Low-Pressure Heating Plants." Heavy demand for the first edition of this booklet, adaptable for design loads 3,000 to 26,000 EDR steam, has justified an expanded edition covering application of underfeed stokers to firetube, watertube and sectional cast iron boilers. Complete specifications criteria cover all aspects of typical heating plant.

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Atoms in Action

JOHN F. LEE

Broughton Professor of Mechanical Engineering
North Carolina State College

The Engineer's Role in Nuclear Technology

THE ENGINEERING PROFESSION has been enduring considerable soul searching over the last several years in an effort to establish a definite purpose for the profession. Although there was some confusion as to purpose before the atomic and space eras, it is clear even to the casual observer that the confusion now has become acute.

This state of affairs is not too surprising for a profession that had become accustomed to codifying its knowledge and technology in handbooks that received a decennial revision. One can only imagine the frustration and consternation of the handbook writers today. The impossibility of codifying engineering knowledge is one cause of the confusion. Another is the insistence that the educational processes needed for preparation for the engineering profession should coincide exactly with the function of the professional practitioner.

The Practicing Mechanical Engineer

At the Annual Meeting of the American Society of Mechanical Engineers held in New York last December, two eminent engineering educators discussed in an open forum the meaning of mechanical engineering. Dean Murrough P. O'Brien, of the University of California, offered an eloquent description of the function of a practicing mechanical engineer. There was insistence by some in the audience that Dean O'Brien had defined, concisely and precisely, the function of the mechanical engineer. This insistence was, I am afraid, merely a manifestation of the desire to climb back into the security of the womb as represented by the handbook era of engineering.

Actually, Dean O'Brien pointed out that although scientific knowledge and scientific curiosity are necessary qualities in the modern engineer, they alone are not sufficient. The engineer also must produce a workable design that meets the tests of the particular economy in which it is to function. Unfortunately, the Dean used the term "hardware" in this connection and nearly all the scientist-engi-

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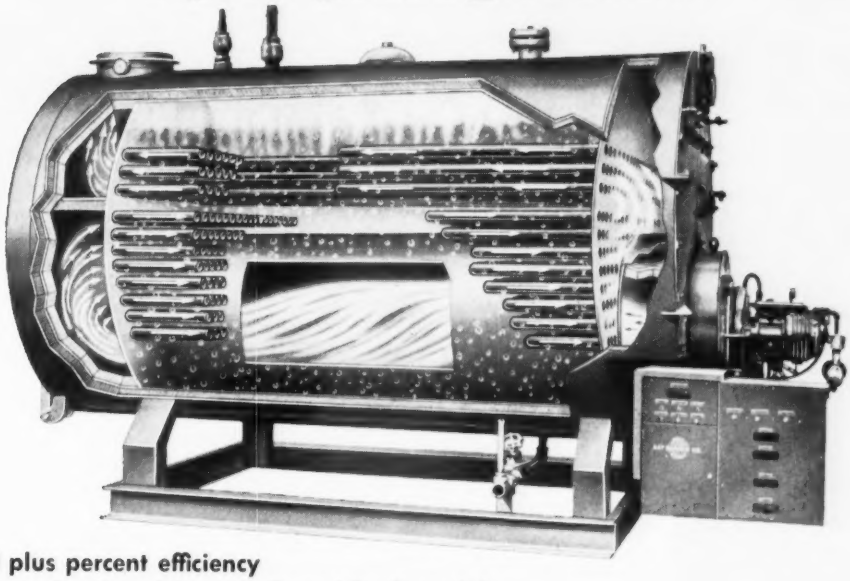

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Forced Draft and Pressure Forced Draft models
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neers rallied in defense of science against the incursions of such mundane considerations.

Professor Joseph Keenan of the Massachusetts Institute of Technology was the other speaker. He confined his remarks to a description of the type of engineering education needed to prepare students for the engineering profession. Professor Keenan stressed the need for a thorough grounding in the basic physical and engineering sciences.

The odd result of Dean O'Brien's and Professor Keenan's remarks was that a majority of the audience thought these two men represented opposing viewpoints. Nothing could have been further from the truth. Dean O'Brien described the functions of a practicing mechanical engineer and Professor Keenan described the best type of education for the practice of the profession considering the limitations on time and resources in our universities.

Physicist or Entrepreneur?

The two speakers presented their ideas excellently – but the meeting lacked an interlocutor with the ability to put the two presentations in their proper frame of reference, and unhappily, the audience failed to do this itself.

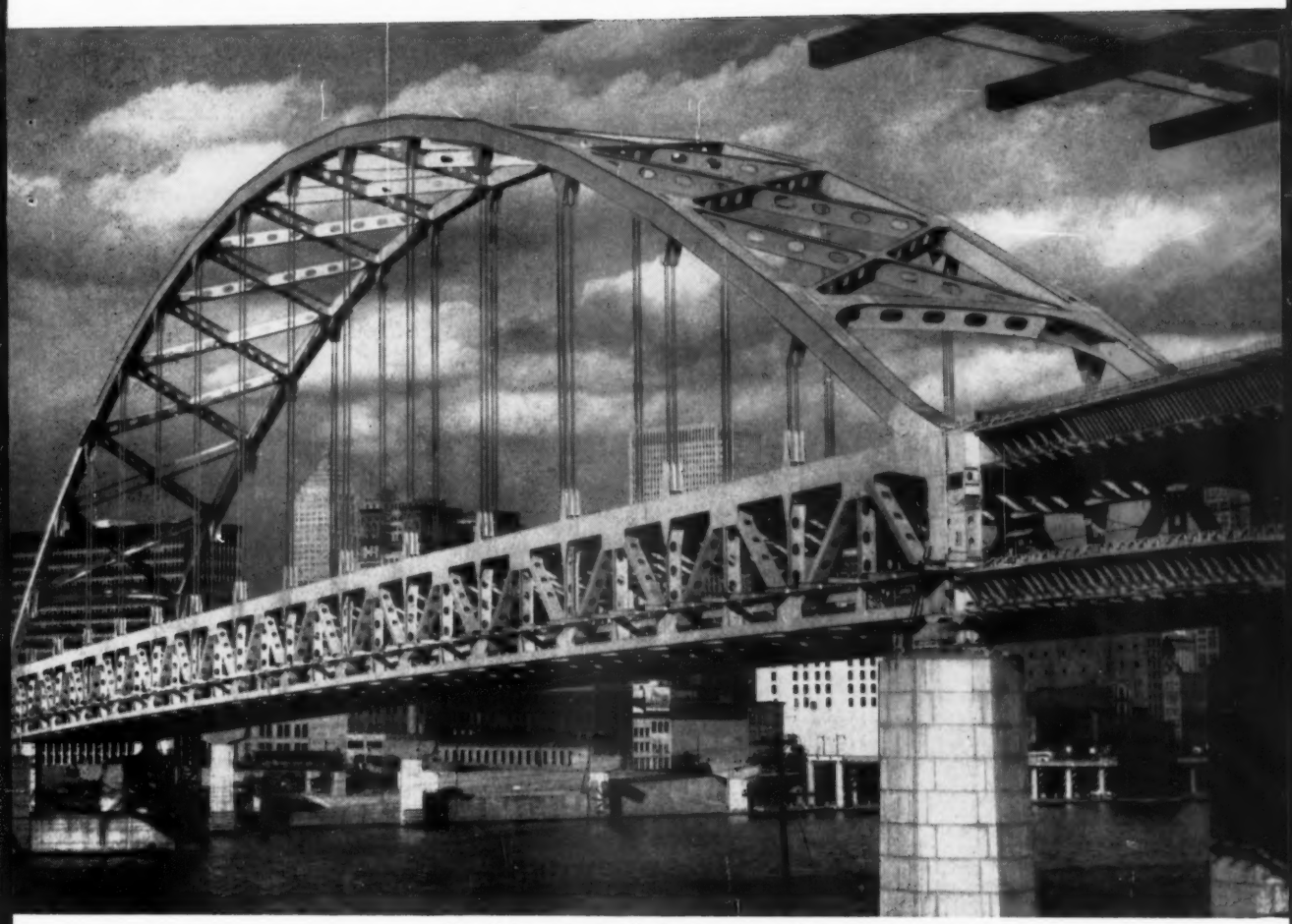
One of the audience asked me whether an engineer should be considered a modified physicist or a scientific entrepreneur.

Actually, the engineer is more than a physicist and much more than an entrepreneur. An engineer seeks to satisfy human needs through the application of science and technology. He must, first of all, be able to recognize human needs; he then seeks to satisfy these needs using every skill and talent available to him. As needs reflect a greater scientific sophistication, the engineer will become more scientifically oriented. Yet he will not hesitate to bridge gaps in scientific knowledge by resorting to empiricism, extrapolation, or even hammer and tongs, for his primary motivation is not scientific elegance but the satisfaction of a human need. He will not hesitate to undertake the most basic or fundamental scientific research if this is what is required. Finally, the engineer recognizes that his profession calls for another ingredient. No need is satisfied until all the practical considerations of production, distribution, and economic analysis provide a product which can be enjoyed universally.

Needless lives would have been lost if the miracle drugs available today had to be sold at a price commensurate with the original laboratory production costs. The science of thermodynamics would not be the elegant structure it is without the contributions of engineers who sought to meet human needs. Modern transportation would not be so universally available if the early engineers who developed the propulsion systems awaited the de-

BIG-SYSTEM EFFICIENCY

velopment of underlying sciences or failed to sacri-



New Gateway to the West — This 8-lane bridge at Pittsburgh's Point was designed by Richardson-Gordon and Associates, Pittsburgh, Pa. It combines a steel arch with Tiger Brand Wire Rope suspenders.

Up she goes! The last link in Pittsburgh's Pitt Parkway

— supported by Tiger Brand, America's No. 1 Wire Rope

USS Tiger Brand Wire Rope was used on all the cranes that did the heavy lifting.

The new double-deck Fort Pitt Bridge spans the Monongahela River and connects the Golden Triangle with a double-deck tunnel under Mt. Washington. This eliminates a serious traffic bottleneck—permits Lincoln and William Penn highway traffic to cross Pittsburgh in half an hour without stopping for traffic lights.

The new bridge is unique in design. It is a double-deck, tied-arch span 752 feet long. Two 4-lane roadways are supported by 112 prestressed USS Tiger Brand suspender ropes, each 3¼ inches in diameter. A total of 8960 feet of suspender rope was used in the bridge.

The construction cranes were all rigged with USS Tiger Brand Wire Rope, mostly one inch in diameter. The heaviest lifts were the corner posts which weighed 118 tons each.

The building of the Fort Pitt Bridge represents the combined efforts of various divisions of United States Steel. Approximately 16,000 tons of steel were rolled for the bridge and its approaches. American Bridge did the fabricating and erecting, and the wire rope and suspender cables were supplied by American Steel & Wire, 614 Superior Ave., N.W., Cleveland 13, O.

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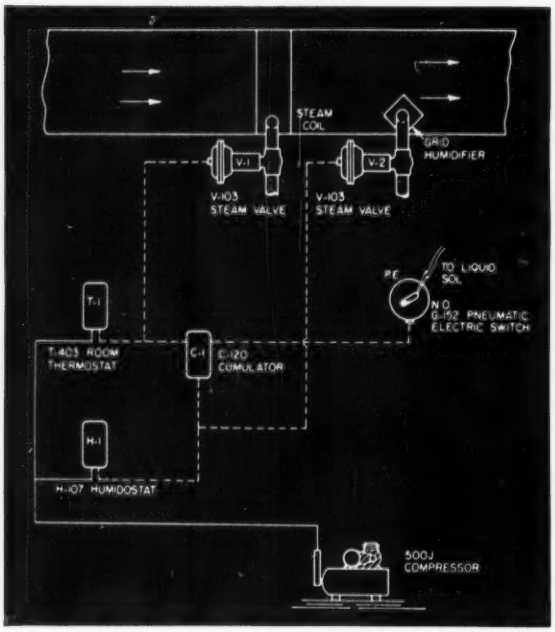

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velopment of underlying sciences or failed to sacrifice scientific elegance for practicality. Modern jet aircraft, rockets, and missiles would not be at their present stage of development if engineers were unable to develop sufficient scientific sophistication to overcome the obstacles to satisfying these needs. Even now communications engineers and neurologists are working together in a joint effort to understand the human nervous system. All of these things are part of the tradition of a profession which defies those who would attempt to confine it within the bounds of a narrow and static definition of its functions.

Nuclear Engineers

Nuclear engineering has been much maligned as a branch of the general profession. From the Manhattan Project to the present development of nuclear aircraft very few significant engineering contributions have been made by either physicists or nuclear engineers. The important engineering contributions have come largely from other branches of engineering and have been made by men who were not frightened by ballyhoo about the complexity of nuclear physics. The engineering sciences of thermodynamics, heat transfer, and fluid mechanics represent far more formidable intellectual structures than the basic science of nuclear physics.

The troubles with nuclear engineering have stemmed from the fact that many nuclear engineers have a good grounding in the principles of nuclear physics but are quite naive in regard to the engineering sciences and the problems of economy, production, and distribution. Many other nuclear engineers have oversimplified their problems where, for example, they regard reactor technology to consist simply of heat transfer and fluid flow. This latter group usually possesses only a thin veneer of knowledge of the basic principles of nuclear physics. It is small wonder that Admiral Rickover, who has made outstanding engineering contributions to the practical utilization of nuclear energy, should be so vociferous about nuclear engineers and the profession in general for spawning such a group. With some notable exceptions, nuclear engineers have been either second-rate physicists or second-rate engineers.

What is needed is a thorough re-evaluation of the engineer's position with respect to the utilization of nuclear energy. Such a re-evaluation is likely to show that mechanical, electrical, chemical, civil, and industrial engineers who have a sufficient knowledge of nuclear physics to serve as a basis for engineering action through the application of the engineering sciences offer the greatest promise of meeting the challenge of establishing a sound nuclear technology. ▲▲

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26-25

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Heard Around Headquarters

THE FEES AND CONTRACTS committee of the New York Association of Consulting Engineers reported, at the annual meeting, that "we are sure that the gloomy picture portrayed will leave few illusions as to the desirability of this [city] work, in the minds of our members."

However, Darl H. Hunt, committee chairman, reported that at least Association representatives now are dealing directly with city officials and appropriate committees instead of channeling problems through architectural groups.

The committee assembled actual data as to drafting costs on both structural and mechanical projects for all building types. Costs were compared with an adequate fee, based on 2½ times drafting costs.

School fees were found to be uniform – all low. And public works fees were described as "hopelessly inadequate." Although at one time New York City housing fees were "reasonably adequate, increasing costs and a switch to more complicated types of housing structures had rendered these fees completely inadequate."

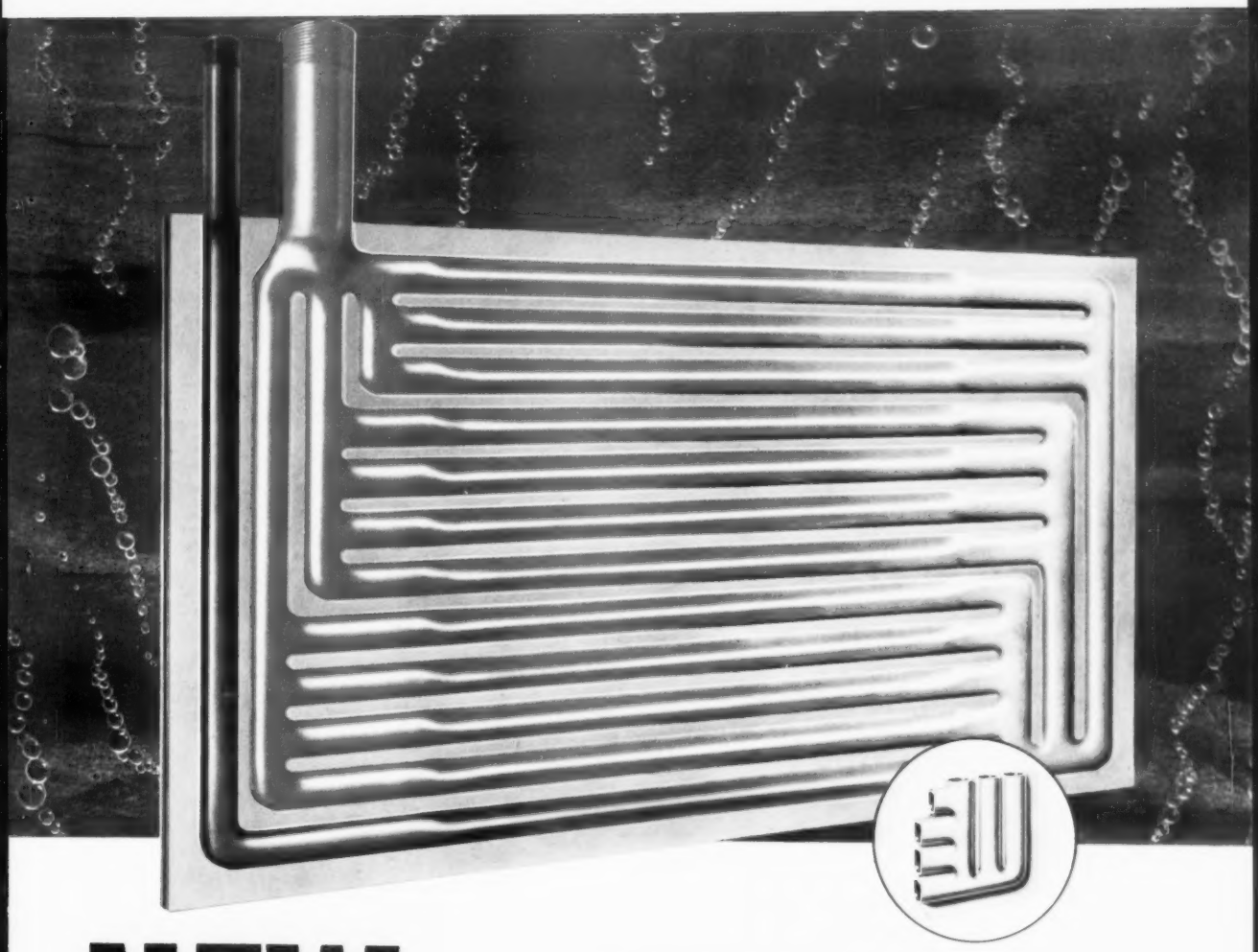
The findings of these studies are being presented to city agencies.

A proposed Association fee schedule for New York City public buildings also has been circulated to members. The schedule sets fees on mechanical and electrical work at from 1.25 percent on a $1 million structure to 1 percent on an $8 million building. Structural fees would be 0.75 percent and 0.5 percent. This is for simple structures, such as warehouses and garages.

For "average structures," such as firehouses, schools, and branch libraries, mechanical and electrical fees would range from 1.35 percent on a $1 million project to 1.16 percent for a $10 million structure. Structural fees would be 0.75 and 0.62 percent.

On buildings of individual character requiring special knowledge and study, such as hospitals, courthouses, and city halls, mechanical and electrical fees on a $1 million project would be 2 percent, and for the maximum $20 million structure, 1.5 percent. Structural fees would be 0.88 and 0.69 percent.

The schedule has a footnote explaining: "Fees for buildings less than $1 million by negotiation. Air conditioning not included. Fee adjusted by negotiation. For alterations add 40 percent to basic fees. Fees shall be computed separately for each building in a group. For repetitive buildings, adjust fee by negotiation. Fees include checking of shop drawings. Supervision of construction is not included. For reinforced concrete, above struc-



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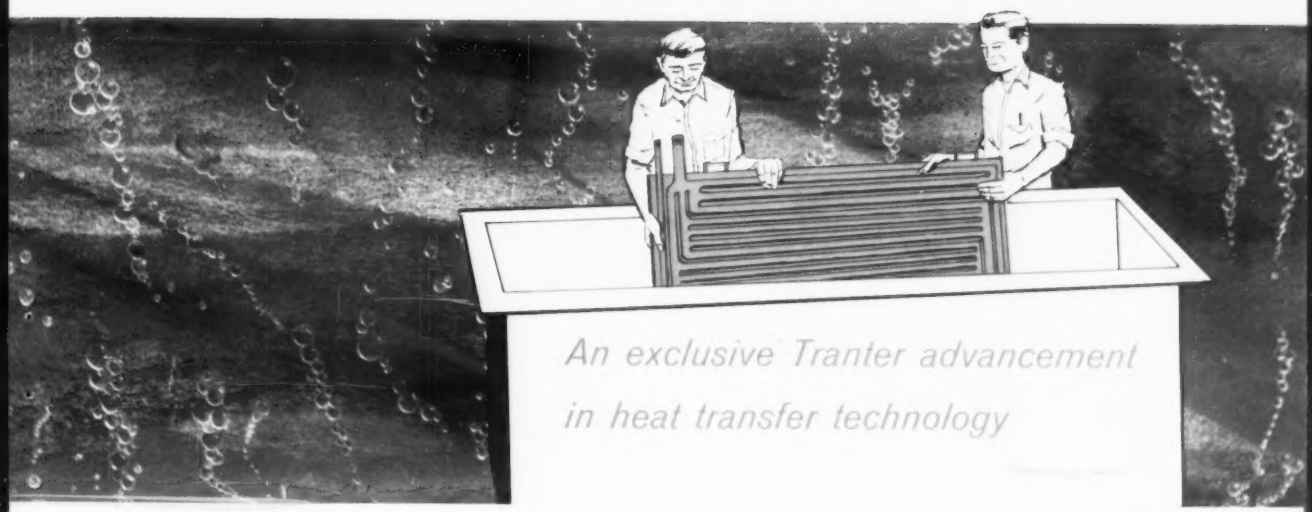

An exclusive Tranter advancement in heat transfer technology

OPERATING PRESSURES UP TO 250 psi

Now the cost and performance advantages of PLATECOIL can be gained in a new range of applications for which operating pressures up to 250 psi are required. Improved construction also provides a safety factor of over 5 to 1 at 250 psi.

FASTER START-UP

The new MULTI-ZONE design improves steam distribution and reduces "trapping." This results in a bonus of heat transfer. FREE-FLO action provides extra capacity to deliver when the coil is called upon to do so. Heat-up time after "shut-down" of tanks or processing vessels is held to a minimum. In cooling applications, the new MULTI-ZONE configuration of the passes permits unrestricted flow for maximum heat transfer.

BETTER TEMPERATURE MAINTENANCE

FREE-FLO action also assures an inherent reserve capacity to handle overload conditions. Fast recovery of required tank temperatures makes possible a new degree of process control under intermittent load and holds "down time" to a minimum.

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Mill-controlled TRANSTEEL . . . the mild steel with built-in corrosion resistance . . . plus DURAWELD bonding of the plates are new construction features introduced to cut corrosion and extend plate life.

NOW YEARS-AHEAD PERFORMANCE ...PROVEN ADVANTAGES OVER PIPE COILS

Increase tank capacity

Because PLATECOIL heat transfer capacity per square unit of surface is greater, the physical size of a PLATECOIL is much less than that of a pipe coil of comparable capacity. In most applications, it is actually possible to increase the work load capacity of a tank by replacing pipe coils with PLATECOIL.

Cut installation costs

Factory-fabricated PLATECOIL units eliminate the cost of engineering, cutting and assembling pipe coils. They are lightweight and easy to handle. Simple brackets and hangers supplied with the PLATECOIL units are pre-engineered and fabricated to add to the facility, speed and economy of installation.

Slash maintenance costs

PLATECOIL units have no threaded joints to corrode or leak. Connections can be located above the liquid level. Removal and cleaning are fast and easy with simple connections, "Quick Change" hangers and streamlined surface. In addition, deposits tend to form less readily on PLATECOIL than on pipe coils.

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Through the use of available capacity and performance data, the engineering time normally consumed in specifying pipe coil requirements is greatly reduced.

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tural fees should be increased by 10 percent."

Other consulting engineer groups also report items of interest.

Pittsburgh – The Consulting Engineers Society of Greater Pittsburgh is preparing a brochure explaining the aims and purposes of the organization. It is expected to be off the presses this month.

New York State – The public relations and publications committee of the New York State Association of Consulting Engineers is publishing a newsletter and planning the publication of public relations and membership brochures.

New Jersey – Robert Morrison, chairman of the New Jersey Association of Consulting Engineers fees committee, is meeting with the chairman of the New Jersey Society of Professional Engineers functional committee. Aim – agreement on minimum fees.

With an annual meeting scheduled for January, the New Jersey Association hopes to have doubled its membership; 16 membership applications have been received by the one year old organization.

Cleveland – The Cleveland Consulting Engineers Association, a functional division of the Cleveland Society of Professional Engineers, has elected the following officers for 1959: chairman, David V. Lewin, Soils and Foundation Engineer; vice chairman, Nathan N. Hoffman, Partner of firm Barber, Magee and Hoffman, Structural Engineers; secretary, Floyd H. Valentine, Partner of firm Mayer and Valentine, Mechanical Engineers; and treasurer, Richard M. Gensert, Partner of firm Gensert, Williams and Associates, Structural Engineers.

The Cleveland Consulting Engineers Association is an organization of registered engineers in private practice licensed by the State of Ohio to render consulting, designing, and supervisory services to architects, owners, municipalities, and industry on construction projects such as bridges, highways,

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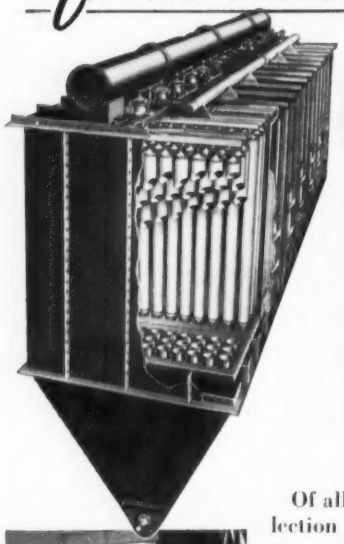

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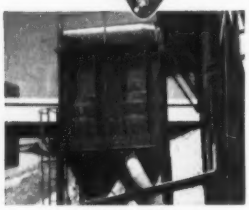

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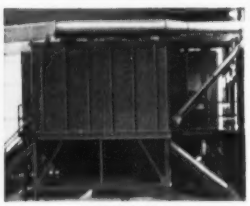

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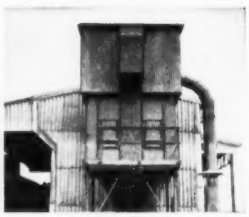

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schools, hospitals, office buildings, commercial buildings, apartment buildings, industrial plants, sewage disposal plants, waterworks plants, or other similar structures involving the design of structural, heating, ventilating, air conditioning, refrigeration, electrical, sanitary, and water supply systems; soil and rock foundation studies; and other engineering services. Headquarters are at the Cleveland Engineering and Scientific Center Building at 3100 Chester Avenue, Cleveland.

Instructions on Behavior

Consulting engineers in Great Britain do not have to worry about their personnel knowing the customs and pertinent facts about countries in which foreign projects are located.

Oversea Service, founded in 1953 and only recently incorporated, conducts concentrated residence courses for men (and their wives) who are about to be sent abroad by their employers. These courses include such topics as health precautions, government organization, geographical factors, and historical backgrounds of the countries selected for study.

According to the *New Commonwealth*, "it is more important than ever before for us to realize how much depends on the attitudes and the behavior of the men and women whom Britain sends overseas as her representatives or by whom overseas business is conducted in this country."

Records show that more than 10 percent of the graduates of Oversea Service have been engineers.

South African Definition

Here is another definition of a "consulting engineer," from the Professional Rules and Practice Manual of the South African Association of Consulting Engineers.

"A Consulting Engineer is defined in the Articles of Association as a person possessing the necessary qualifications to practice in one or more of the various branches

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of engineering who devotes himself to advising the public on engineering matters or to designing and supervising the construction of engineering works and for such purposes occupies and employs either solely or in conjunction with another Consulting Engineer his own office and staff or in the case of a partner or consultant of a firm of Consulting Engineers uses the office and staff of the said firm and is not directly or indirectly concerned or interested in commercial or manufacturing interests such as would tend to influence his exercise of independent professional judgment in the matters upon which he advises."

Massachusetts Law

Registration is now mandatory in Massachusetts for engineers offering their services to the public. Until the act was signed, Massachusetts was the only state, including Alaska, with optional instead of mandatory registration, although California currently requires registration only for civils and structurals.

Persons licensed under the previous permissive Act by the Board of Registration will continue without any action on their part to be licensed under the new Act. The Board of Registration will require the same qualifications for registration of engineers and land surveyors as before. Experience and education must be proven, either by a college degree or through a written examination, and the Board must satisfy itself as to the individual's ability to perform satisfactorily the practice of professional engineering or land surveying.

The new Act permits out-of-state engineers to practice in Massachusetts only if they are registered in the State; otherwise, their professional activities in the State are limited to an aggregate of 30 days in one year, and then only if they are registered in a state having equal or higher requirements than Massachusetts.

Wage Gains Continue

The Engineers Joint Council salary survey, published in mid-January, shows earnings of engineers are continuing upward.

The median (for engineers in all types of work) was $6500 in 1953, $7750 in 1956 (19 percent increase), and $8750 in 1958 (up 13 percent from 1956). During the past two years, engineers' salaries increased by 13 percent, the Consumer Price Index rose 1.5 percent, and the Average Gross Weekly Earnings for Production climbed about 10 percent.

"Hall of Fame"

The idea of an "Engineering Hall of Fame" for the new headquarters keeps reappearing. In early discussions of the proposed new building, a Hall of Fame was suggested. No action was taken on the suggestion.

Now an Engineers Joint Council committee has suggested that a for-

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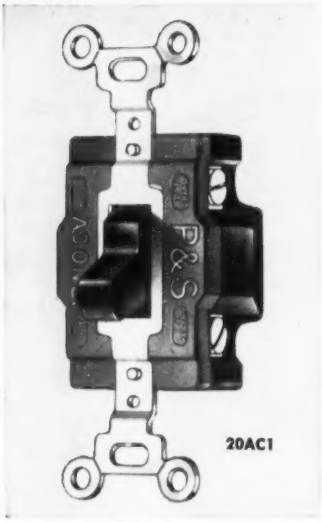

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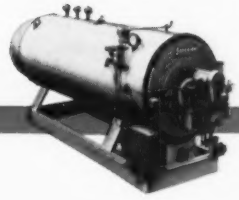
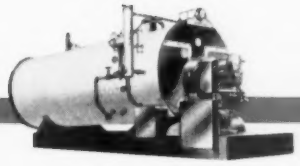


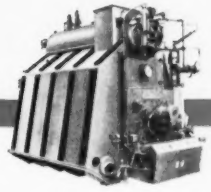
TYPE "C"

Horizontal four-pass fire tube packaged boiler for installations where space is limited. Capacities from 20 to 350 bhp. Fully automatic, burning oil, gas or both. Equipped with dependable Superior Rotary Burners and induced draft. Pressures to 250 psi. or for hot water operation. Write for Bulletin 1007C.

TYPE "F"



Horizontal four-pass fire tube Type "F" units are fully automatic, burning oil, gas or both. Capacities from 20 to 600 bhp. Pressures to 250 psi. or for hot water. Built-in induced draft for clean, quiet operation. Write for Bulletin 1007F.



TYPE "AS"

Completely packaged water tube boilers for steam capacities as low as 4000 lbs. of steam per hr. Fully automatic, burning oil or gas or both. Design pressure 190 psig. Rear-mounted mechanical draft fan, air-cooled furnace floor and firing front. Maximum capacity 13,000 lbs. of steam per hr. Write for Bulletin 1007S.

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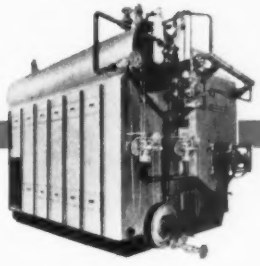

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mal approach be made to the United Engineering Trustees to see just what the status of the Hall of Fame is.

Favorable Rulings

Two more attorneys general have ruled that it is not mandatory to advertise for bids when selecting a consulting engineer.

In South Carolina, site of a long-standing battle between the American Society of Civil Engineers and the highway department, Attorney General T. C. Callison ruled that:

"It is my opinion that under the amended (1956) Section, it is not mandatory for the Department to advertise for professional services of bridge or other engineers on any bridge or highway project; however, it is my opinion that the amended Act does not prohibit the Department from advertising for such professional services. It is my opinion, therefore, that the question of advertising for engineering services is a matter in the sound discretion of the Chief Highway Commissioner of the . . . Department."

A Columbia attorney obtained the decision at the "suggestion" of the ASCE.

In response to a letter from O. B. Curtis, secretary of the Mississippi State Board of Registration for Professional Engineers, a similar opinion was expressed.

Attorney General Joe T. Patterson said:

"I am of the opinion that a contract for professional engineering services is just like that for any other professional services, such as an attorney, and that a public agency is not required by law to advertise for such bids for such professional engineering services."

CIB Manual

The Concrete Industry Board has recently completed a "Manual of Recommended Practice for Cast-in-Place Exposed Architectural Concrete Finishes."

The brochure, described as a "recommended workable specification," includes a detailed description of general conditions, materials, specifications, form work, reinforcement, placing concrete, stripping and curing, and finishing.

"It is recognized that the placing of covering veneers on concrete surfaces adds very materially to the cost of concrete structures without in any way improving their structural soundness. It is felt that proper treatment of concrete surfaces can produce a satisfactory finish, both in texture and appearance, on the concrete itself, thereby eliminating these additional costs," the brochure explains.

Disparity

Miscellaneous information department. Leo E. Brown, Public Relations Director of the American Medical Association, said the AMA spends about $1,200,000 each year for public relations. Publicity budgets for four of the five Founder So-

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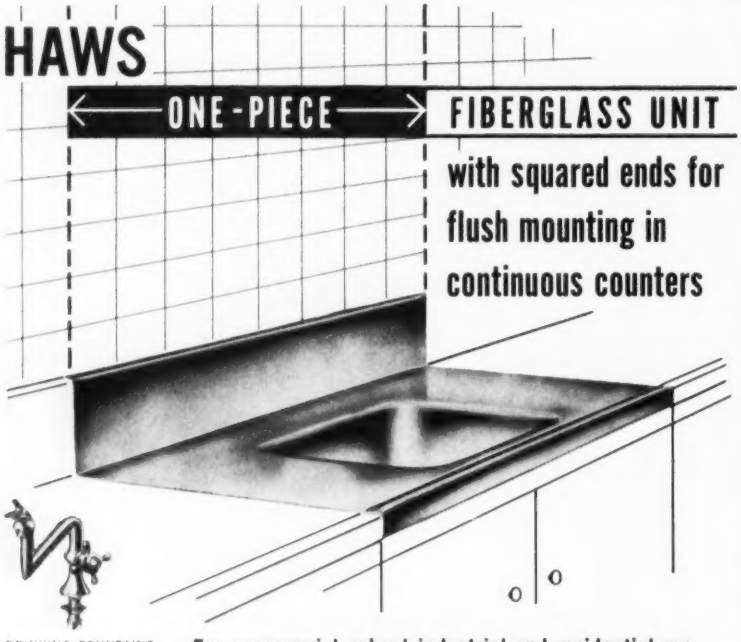

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cieties and EJC are: ASME – $40,000, AIEE – $25,000, ASCE – $18,000, AIChE – $10,000, and EJC – $6000. And bear in mind that the total of $99,000 – only a small percentage of the AMA budget – is at least partially diluted through duplication of efforts.

ASA Survey

The American Standards Association is conducting a survey among more than 2000 firms to find out how extensively standards are used and how much industry and engineering benefits financially from the standards.

One early reply (the survey is not to be completed for at least another month) was from an engineering firm employing 350 people and spending about $2000 a year on standardization. Savings, mostly in engineering and drafting time, were estimated at $25,000 a year.

AIChE Program

Emphasis this year in the professional development committee of the American Institute of Chemical Engineers will be in the encouragement of a professional attitude among college engineering students, according to Professor Lewis Coonley, chairman.

At its last meeting, the committee also endorsed a proposal to encourage engineering students to register as soon as possible after graduation. Although the AIChE does not recognize registration as a requirement for membership, it does encourage young engineers to register just in case they find themselves in responsible charge of projects involving the public safety at some time in the future.

Exemption Limits Revised

As of Feb. 2, new salary requirements will go into effect for the exemption of executive, administrative, and professional employees from provisions of the Fair Labor Standards Act.

These revised schedules require that, in order to be exempt from minimum wage and overtime provisions, an executive employee must be paid at least $80 a week (up from $55). Administrative and professional employees must be paid at least $95 a week (formerly $75).

Engineering Manpower

The Engineering Manpower Commission has released its third semi-annual study on trends in the demand for engineers. The report shows the demand for graduates continues high, but most organizations met recruiting goals last year.

"In short, the emphasis on recruitment in 1958 shifted from numbers to quality and more specific specialties," the report concludes.

Last year, more engineering graduates were added to the economy than in any year since 1950. The study showed that of this class of 35,000 (a 12 percent increase), 60 percent had accepted jobs before June, 10 percent planned to enter graduate school, and 20 percent had "other definite plans."

Even the government had more luck in recruitment of engineers than in previous years.

Asked to project recruitment plans, consulting engineers and industry both indicate increasing recruitment in the next few years.

However, the survey showed that for the first time since 1950, the size of the freshman engineering class decreased. The engineering schools showed a decrease of 13 percent, while over-all enrollment increased by 7 percent over the same period.

"Such a downward adjustment, if developed into a trend, could have serious manpower implications in the years immediately ahead," the Manpower Commission concluded.

An additional study now is under way to discover the reasons for fewer students enrolling in engineering. The results are expected to be announced in mid-February. Higher qualifications required for entrance into engineering schools are expected to account for a portion of the decrease. ▲▲

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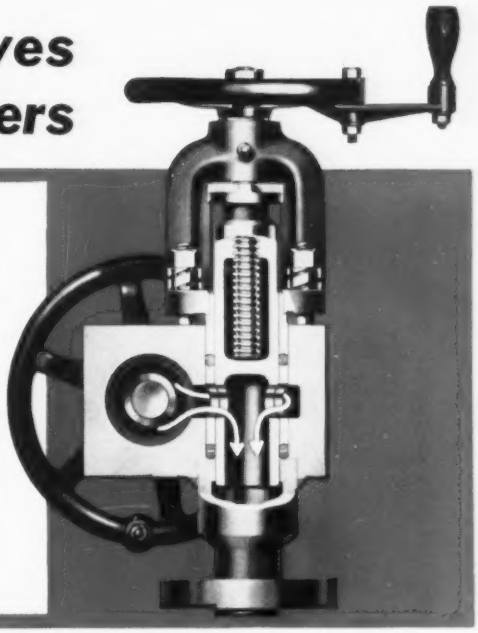
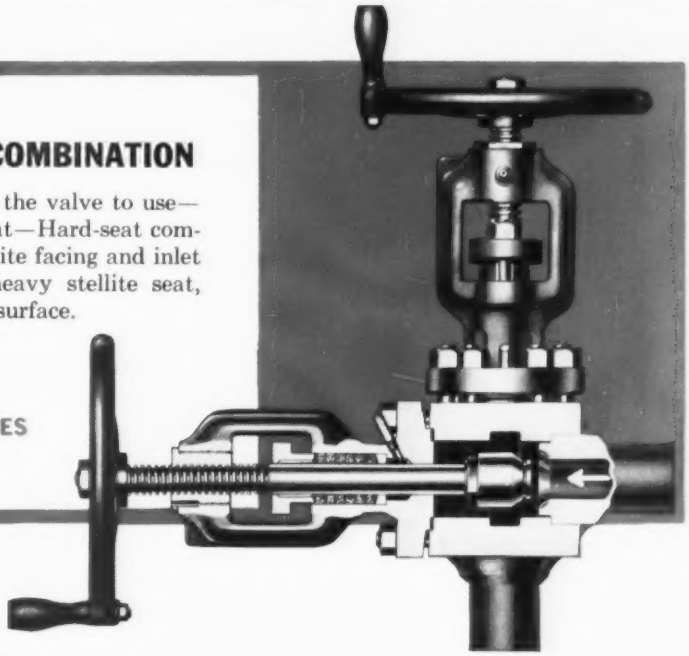
rugged blow-off valves for high pressure boilers



HARD-SEAT—SEATLESS COMBINATION

■ For boilers up to 1500 psi, this Yarway Unit Tandem Blow-Off Valve offers the maximum in dependable service. A one-piece forged steel block serves as the common body for the Yarway Stellite Hard-seat blowing valve and the Yarway Seatless sealing valve. All interconnecting flanges, bolts and gaskets are eliminated. The Unit Tandem at right is sectioned through Seatless Valve to show balanced sliding plunger in open position and free flow.



HARD-SEAT—HARD-SEAT COMBINATION

■ For boilers to 2500 psi, this is the valve to use—Yarway's Unit Tandem Hard-seat—Hard-seat combination. Disc has welded-in stellite facing and inlet nozzle has integral welded-in heavy stellite seat, providing smooth, hard-wearing surface.

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YARWAY **BLOW-OFF VALVES**

Concrete Construction in Ancient Rome

GIORGIO PELLEGRINI
and
EMANUELE F. RADOGNA
University of Rome

Villa Adriana in Tivoli. What remains of the large cross vault constructed of opus caementicium covers the hall of the Baths. Notice the insertion of a few bricks to provide a better grip for the plaster.

This is the base of a Columna Honoraria built on the Via Sacra by the Emperor Diocletianus. Construction is opus caementicium with brick facing. The caementa are marble fragments. Note that in the ancient terminology, caementa referred to the aggregate while the materia was the binder involved in the mix – the reverse of our designations.

CONCRETE EMPLOYED by the ancient Romans was made up of crushed stone *(caementa)* and mortar *(materia)*. Unlike the modern word "cement," *caementa* referred to the aggregate not the mortar.

CE exclusive

The *caementa* evidently depended on the type of stones found in the region. For example, in Latium, where a large volcano was intensely active a long time ago, the *caementa* are mostly fragments of leucitic lava and calcareous tufa, less often fragments of limestone or marble. But even fragments of tiles were used.

Composition

The single elements of the *caementa* were generally rather large – 4 to 5 inches across. In any one structure they were all about the same size – there was no gradation – and they had the characteristic shape of crushed stone.

Mortar consisted of lime *(calx)* and sand *(harena)* or lime and pozzolana *(pulvis)*. Through the writings of the imperial architect Vitruvius, we know the composition of the mortars: one part lime and three parts quarry sand (by bulk), or one part lime and two parts sea or river sand, often with crushed tile added to absorb excess water. For construction in a damp area, mortar was mixed

Two photographs showing the ruins of the temple of the Goddess Luck in Palestrina. At top is a barrel vault with a lacunar ceiling of opus caementicium. Note the tiles inserted near the extrados as a means for improving the waterproofing. Below is shown an example of opus incertum construction on one of the ramps leading upward to the temple proper.

of one part lime and two parts pozzolana, which gave the mortar a high ultimate strength. After hardening, this mix was almost the equal of a present day mortar.

Different Types of Masonry

By mixing *caementa* and *materia,* the Romans obtained the concrete called *opus caementicium.* From the most ancient period *opus caementicium* was used for small buildings and country villas. Later it was used for more important construction – the walls of Alba Fucensis (303 B.C.) and the foundations of the Capitolium in Pompei (3d century B.C.), and for all types of masonry, foundations, walls, water tanks, and vaults. Sylla used *opus caementicium* when he started rebuilding the towns destroyed during the war against Marius.

Roman concrete was not premixed: first the *caementa* were laid down, then the *materia* was grouted. Finally the whole was well compacted with a tamper. When building foundations, a good compaction was effected every 12 inches, and quite often the trench was propped with board forms to avoid landslides. Traces left by those boards on the external surface of the underground foundations can be seen where they have been uncovered, as shown in the photo at the top of page 86.

Concrete Construction in Ancient Rome

Springer of a barrel vault made of opus caementicium.

Basement of the Arch of Titus, an example of opus caementicium poured into a trench. Note caementa in lava and marble layers.

Villa Adriana in Tivoli with Dome of Temple of Serapis.

Facings

For above-ground construction, the *opus caementicium* needed some kind of facing. Many designs were developed using an *opus caementicium* core with different facings. The most important were:

¶ *Opus incertum*, where the facing was of the same stone used for the internal core, but laid with particular care.

¶ *Opus reticulatum*, where the facing was stone blocks tilted at 45 degrees to form a diamond pattern. These blocks were pyramid-shaped, laid so the apices pointed toward the concrete core, improving the bond between the core and facing. Pyramid blocks were generally 2 to 4 inches on a side.

¶ *Opus mixtum*, which was simply *opus reticulatum* with horizontal layers of bricks used to improve the distribution of the load. The horizontal layers interrupted the skew lines of the facing.

These facings not only protected the core against weather, but also served as a form into which the concrete core was poured.

Skilled workers first laid down two or three layers of the facings, then unskilled workers poured the *caementa* and the *materia* in the space between. Then, two or three more layers of the facings were raised, and the process repeated.

Vaults and Domes

Concrete used in constructing vaults often was poured on wooden centerings. Sometimes a brick and mortar centering was used, then left in place to form the vault intrados.

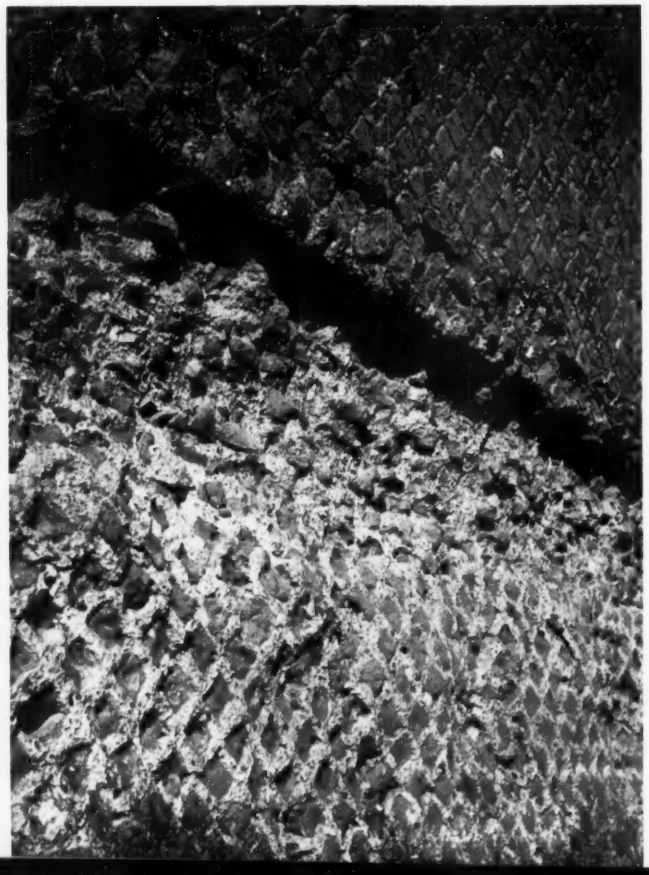
The influence of concrete on Roman architecture was great. Concrete made it possible to abandon the rigid linear shapes imposed by wood and stone and replace them with domes and arches of impressive sizes. Its influence also may be seen in the planimetric design of buildings, since it was necessary to create structures which could support horizontal thrusts imposed by the domes. The Caracalla Baths, in Rome; Villa Adriana, in Tivoli; and the Pantheon, in Rome are examples.

Weight was an important design factor. In building the Pantheon dome (which spans 130 feet) a light pumice concrete was used. Another way of lightening the vaults was by including terracotta vases in them, as in the Tomb of S. Helen, at Tor Pignattara.

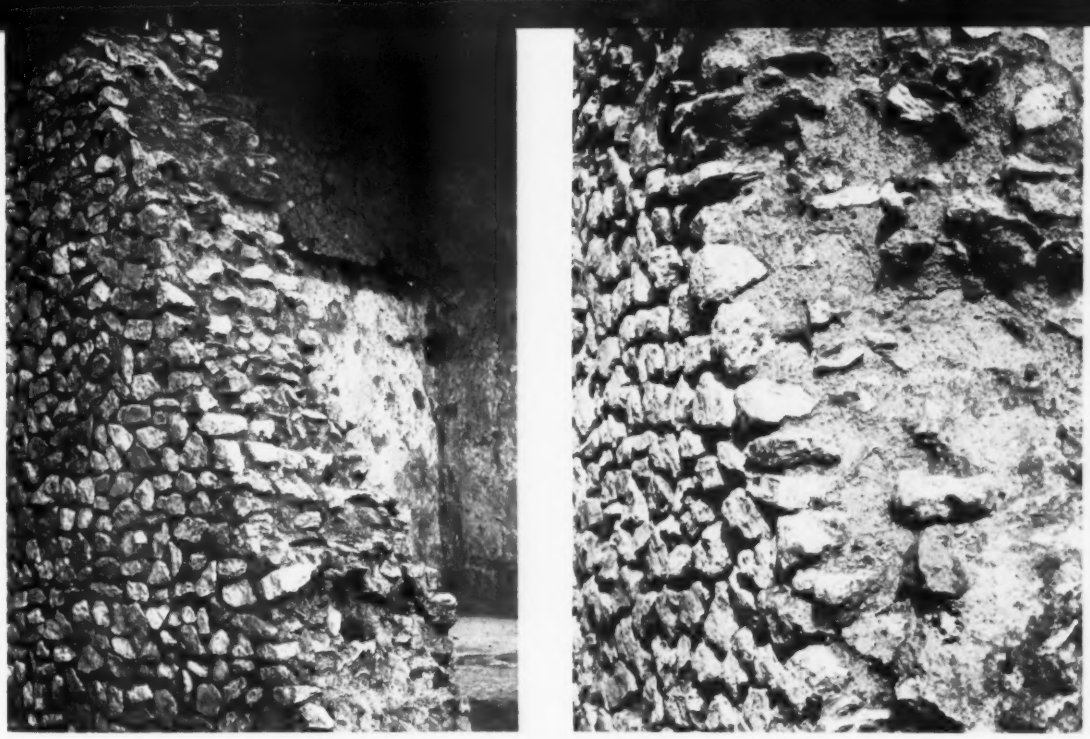
While the concrete of ancient Rome was not as strong nor as consistent as our product today, it was a most important discovery, making it possible for Roman builders to use their imagination in creating shapes never before attempted. ▲▲

Concrete Construction in Ancient Rome

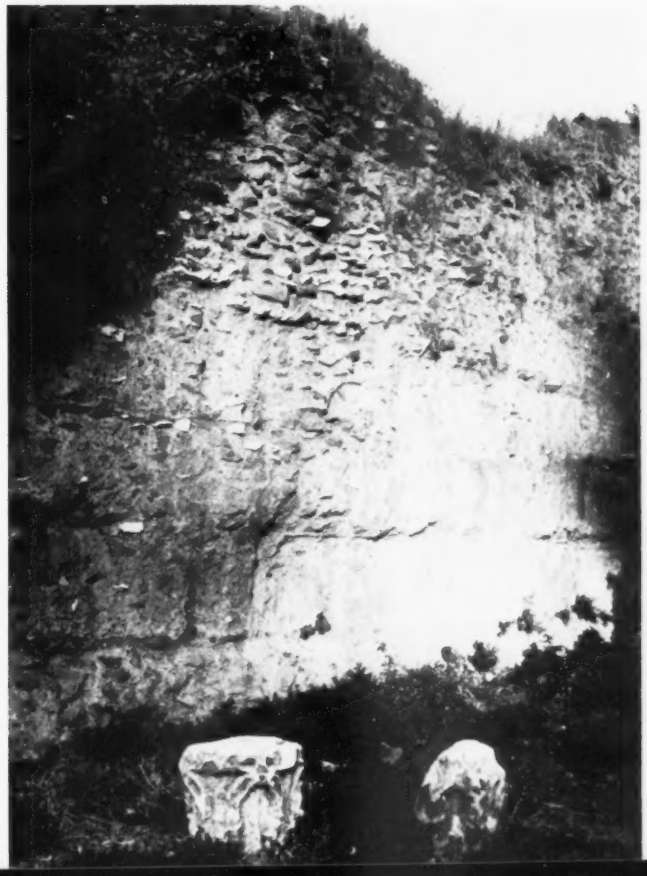
Foundations of one of the buildings of Nero's Domus Aurea, near the Temple of Venus and Rome. The foundations now are uncovered, and it is possible to observe the traces left by the boards and the squared lumber used for forms during construction.



Wall of Stoa Pecilis in Villa Adriana, Tivoli. In the upper part is a well preserved opus reticulatum. Just under it were layers of bricks, now crumbled. The lower portion of the wall is also opus reticulatum, but with the surface removed. Because of the pyramidal shape of the tufa blocks, this mortar appears thicker than that in the upper part.



Left — Photograph of the Temple of the Goddess Luck in Palestrina shows opus incertum of one of the walls dividing cells of the upper terrace. Right — Details of the opus incertum.



The Temple of the Castori. Opus caementicium core originally was covered with large stone blocks. In the lower part, the caementa are tufa stone; in the upper part (floor was raised during Augustus' period), some small fragments of the travertine still can be seen.

A Portrait Of The Profession--1959

Part 2 — Fees and Finance

THE PRIVATE PRACTICE of engineering is big business. The 1959 survey of the profession shows that on the average, a consulting firm specifies just about $4,250,000 worth of materials and equipment for the projects it designs each year. The smaller firms, with less than 20 people on the payroll, each average about $3 million worth of materials and equipment specified per year. Figures for the large firms run rapidly upward to one mammoth organization which specifies about $365,000,000 worth a year, or $1 million a day, every day of the year.

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Extensions based on samples are notoriously inaccurate, but if there are in this country approximately 6000 firms of consulting engineers doing design for construction, they specify better than $25 billion annually in materials and equipment. Even admitting the statistical difficulties involved in an extension based on a sample, no one would deny that private practice is big business.

Of more direct importance to the consulting engineer is the matter of finances within his own firm. Regardless of how many millions of dollars worth of equipment he specifies or how many millions are represented in the construction of the projects he designs, the owners of a consulting engineer firm fundamentally are more concerned with their own firm's income and the way in which that money is disbursed in keeping the business going.

Firm Incomes

The average annual income from fees for a consulting engineer firm is about $10,500 per person on the payroll, and most firms fall within ± five percent of this figure. For example, a typical small firm with 5 on the staff should have an annual income from fees of about $52,500; one with 50 on the staff should have an income of 10 times that much.

Oddly enough, the range holds true regardless of firm size, provided the firms considered all do roughly the same type of work. The sole exception is a one man operation, and here the average annual income rises steeply to nearly $21,000.

However, there is no reason for all successful firms to fall within the broad band of $10,000 to $11,000 of income per person, for there are wide variations between the several branches of the profession and between types of organizations. A civil firm made up of one engineer-owner and 20 survey crew members would not be expected to have as high a per person income as a highly technical firm made up of 10 engineers and a stenographer. But fairly typical firms dealing in design and supervision of construction should come at least close to this broad band, regardless of their personnel distribution, if they expect to stay in business.

Fee Schedules and Fee Levels

There probably has been more material published on the establishment of fees than on any other subject of direct interest to the consulting engineer. Nearly every national or state engineering society has published a recommended minimum fee schedule, so there should be no engineer's office in the country that does not have some printed guide. Despite this, only 58 percent of the firms in this survey said they based their fees on published schedules.

This does not mean that 42 percent are fee cutters. Just the opposite is indicated. Most of the firms that do not use a fee schedule imply that they charge more than the recommended minimum. This would not seem unreasonable, for the printed schedules are, generally speaking, "recom-

mended *minimums*," though there is undoubtedly a tendency for these minimums to become standards. Also, the great majority of published schedules are sadly out of date, and they might be more appropriately applied to conditions of five years ago than to those of today. Quite naturally, then, a substantial percentage of the firms charge more than the recommended minimum shown on published schedules.

Average Per Diem Fees

It is impossible to deal with consulting firms as a whole and make any reasonable computations that indicate an average percentage of construction cost fee charged by the profession, for mechanicals and electricals use a different type of percentage fee formula from that used by civils; structurals use yet a third. However, it is possible to establish a meaningful average based on per diem fees. The average per diem fee for owners, partners, and principals is $99.58 per day, which can be rounded off to an even $100.

As shown in Fig. 1, this average figure varies slightly for different size firms with the very small firm charging a little more than the firm with 4 - 8 persons on the payroll. The larger firms charge more than average for the services of their top men on a per diem basis. The reason the very smallest firms charge a little more than the next group is that many of the one-man firms are "experts" in special fields, and they tend to charge a higher per diem rate for their technical advice than do the heads of more conventional design and supervision firms that deal primarily with new construction.

The per diem type fee, as shown in Fig. 2, accounts for 23.8 percent of the average firm's income, and the rate charged is not, therefore, to

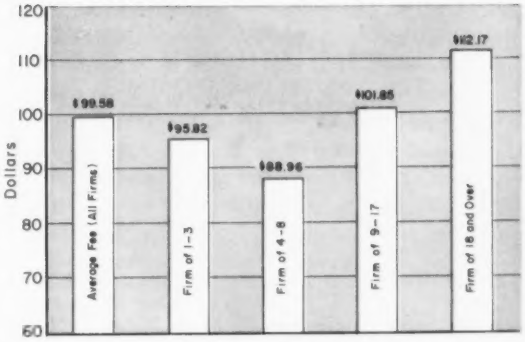

Fig. 1 — Per diem charges for services of owners, partners, or principals in small and large firms.

be taken lightly. In the large firm the per diem charged for the partners and principals may not be vital to the financial success of the firm, for this is a small item in total firm income. Even though 18 percent of the large firm's income comes from per diem charges, most of this is from services of project engineers and those below rather than from the services of the owners themselves. But in the small firms the per diem charge is most vital. Not only do these firms get 34 percent of their income from per diem fees, but much of this represents work of the owner or the partners.

Per Diem Fees Should Be Doubled

How can these small firms exist if fully one-third of their income is derived from a charge of $96 a day for engineering services? This may sound like a lot of money when quoted to a client, but when analyzed, it turns out to be peanuts. Applying the formula used in determining charges to clients for the hourly services of employees (245 working days and 2.4 times salary), a per diem of

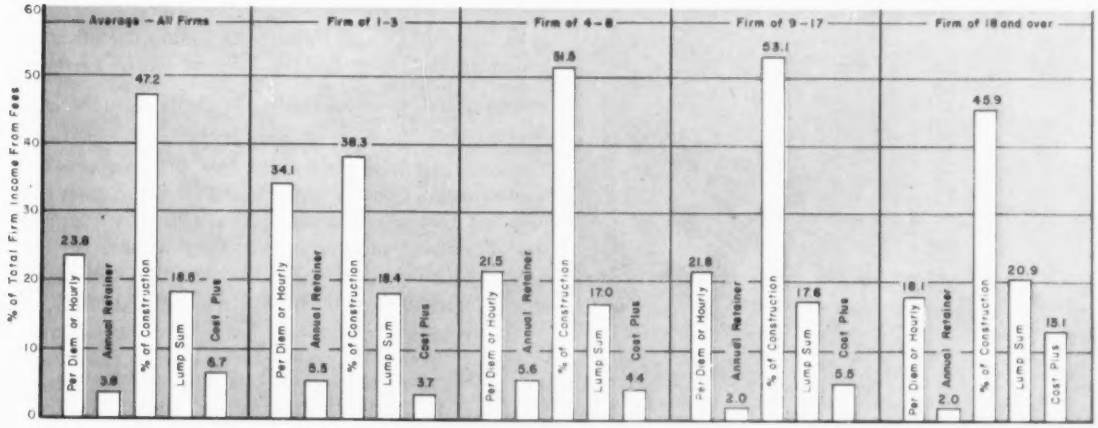

Fig. 2 — The average percentage of total firm income from the various types of fees and for various size firms.

$96 is equivalent of an annual salary of about $10,000 a year. This is a fact the owners of small firms should keep in mind when they quote their per diem rates. Currently, the owner or partner is likely to be about the poorest paid engineer in the firm, and all too often he does not control it. He should realize that if he rates himself as worth $25,000 a year, he must charge at least $200 per day when working on a per diem fee basis.

Fee Schedules

The accusing finger should be aimed directly at the framers of fee schedules. Most published schedules show per diem fees for consulting engineers at $75 - $100. So long as these ridiculously low figures are circulated for clients to see, there is little hope for improvement on a substantial scale.

It is true, however, that almost half of the average firm's income is derived from fees based on percent of construction cost, while the lump sum (or fixed fee) accounts for 18.5 percent (see Fig. 2). It would be encouraging if it could be found that there is a trend away from fees based on percentage of construction cost, but it is impossible to prove that such a trend exists, for there are no comparable studies of an earlier date. There has been, however, much talk among consultants concerning the foolishness of a fee formula that penalizes the consultant financially whenever he efficiently reduces his client's costs on a project. Unfortunately, it is unlikely that there can be any major movement away from this type of fee so long as architects stubbornly stick to it. Many engineering fees are tied in directly with the fee paid the architect.

Charges for Employee Services

Even more important than the per diem charged for a principal's time is the hourly rate charged for employees. A firm can fail or succeed rather quickly on the basis of this charge.

Accounting is one aspect of business operations in which consultants have not as yet reached any state of uniformity. There are almost as many formulas for figuring hourly charges for employees as there are consulting firms. Yet, all these formulas can be separated into two types: those based on salary and those based on payroll costs. The difference is that those based on payroll costs first add to the salary figure some percentage representing the cost of vacations, holidays, payroll taxes, and miscellaneous fringe benefits, then they apply their formula to this figure. Firms using salary as the base may arrive at the same final figure, but their formula will have to involve a higher multiplier or percentage figure to compensate for the lower base.

Many firms make use of a three-factor formula

Correction — — January 1959 Issue

Chart From Bottom of Page 88

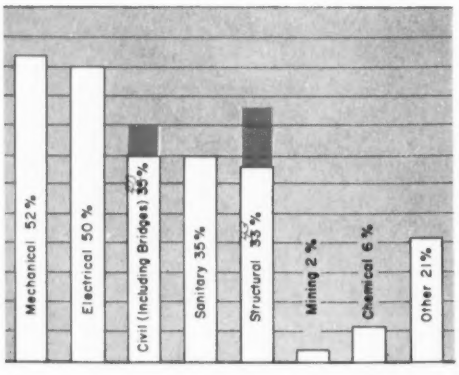

Fig. 1—The percentage of consulting firms that engage in each of several branches of engineering.

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Fig. 1, mechanical engineering is the largest single field by actual number of firms involved, about 52 percent of the firms answering offering mechanical engineering services to some extent. Electrical is just slightly behind with exactly half of the firms reporting that they do this type of work. Civil, ~~sanitary,~~ and structural follow with about ~~a third~~ 40% of all firms engaged in each of these branches, while about a third are in sanitary. Chemical and mining are rather low so far as numbers of firms are concerned, but "other" is fairly popular, with about a fifth of all firms offering special services such as rate studies, machine design, city planning, traffic and transportation studies, and a multitude of other miscellaneous engineering activities.

Data presented in "A Portrait Of The Profession — 1959" in the January issue underrated two branches of the profession (civil and structural). Please correct your copy of the article as shown above.

involving salary (S), a percent of salary (X), and a multiplier (Y). Then the formula takes one of two forms:

$$Y(S+X) = \text{Charge to Client} \quad (1)$$

or

$$YS+X = \text{Charge to Client} \quad (2)$$

These same two forms are used by firms using the payroll costs as the base. Payroll costs are substituted in place of salary in the formulas.

It is obvious that if the same multiplier and the same percentage of salary figures are used in the two formulas, the firm using formula (1) is going to come out ahead of the firm using formula (2). Most firms seem to understand this simple fundamental of mathematics, and compensate by using a higher percentage or a higher multiplier when applying formula (2), but some apparently forget to adjust. The average charge for firms using formula (1) turns out to be $2.28 per $1.00 salary, while the average for those using formula (2) is a slightly lower $2.24.

Firms that start with payroll cost rather than a salary figure appear to be doing best of all. They show an average of $2.05 on the dollar of payroll costs when using formula (1) and $2.00 when using formula (2). If it is assumed (as it generally is) that payroll costs runs above salary by $0.15 to $0.20 on the dollar, and if $0.17 is taken as an average, then these payroll figures are the equivalent of about $2.34 and up, depending on just what multipliers and what percentage figures are used in the formulas. Again it will be noted that the firms using formula (1) charge a little more than firms using formula (2).

While there is a terrific range of multipliers and percentages in use, several formulas are fairly popular. These are the simplified formulas in which the percentage figure is eliminated. The most popular are:

Salary times 2
Salary times 2.5
Payroll times 2 (the approximate equivalent of salary times 2.34)

There are some rather interesting extremes. One firm says that it charges simply straight salary. This firm is either on its way out of business or it is a one-man firm and the "salary" is high enough to cover all the costs of doing business. At the other extreme, one firm charges $4.50 for each $1.00 of salary. This firm should be doing quite well if it gets much work on this basis. There are a substantial number of firms, however, that charge $4.00 and about an equal number at the other end of the line who charge $1.50 or less for each salary dollar.

In this connection it is interesting to note the results of a recent survey of operating costs made by the Consulting Engineers Association of Oregon. This survey showed that operating costs of the reporting firms, starting with one dollar of productive salary, averaged $1.89, with a minimum of $1.51 and a maximum of $2.78. This means that in Oregon it costs, on the average, an additional $0.89 on every dollar of salary when a firm sends an employee out on a job. If it costs this much to send a man out to work for a client, it is clear that the charge must be more than $1.89 if the firm is to make a profit. Also, there is no doubt that operating costs are higher in some parts of the

TABLE I—HOW A CONSULTING ENGINEER FIRM DISBURSES ITS INCOME

(Based on total income before deduction of income or corporation taxes)

	Percent
Salaries, wages, & profits	74.2
Engineering materials & equipment	3.4
Office space	3.7
Office equipment & supplies	2.3
Advertising, publicity, & client promotion	2.0
Transportation	3.8
Dues & contributions	1.4
Insurance	1.4
Utilities	0.9
Taxes, other than income and payroll	1.1
Special services (legal, etc.)	2.0
Depreciation	1.4
Miscellaneous	2.4

These figures are the average of all firms in the survey. There is little difference between large and small consulting firms, with the following exceptions:

¶ Large firms spend a slightly higher than average percentage for office space and office equipment.

¶ Small firms spend a higher percentage for engineering materials and special services.

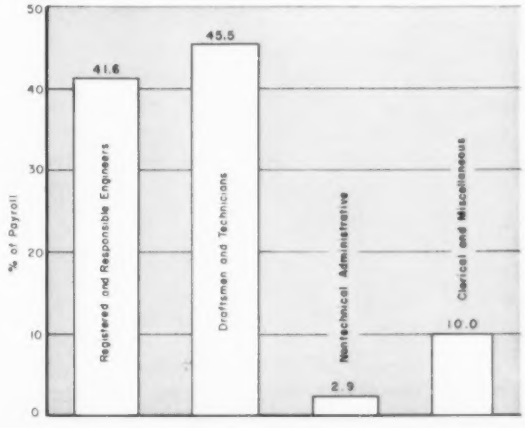

Fig. 3 — Average division of payroll among several employee categories, excluding owners or principals.

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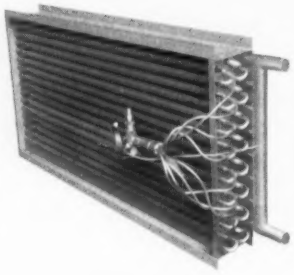

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country than in the Pacific Northwest. Surely, one of the easiest ways to go broke is to charge a client less than twice the salary of the man on the job — and some firms may have to charge three times salary to break even.

Operating Costs

If the need for some standard accounting system is indicated by the wide variety of formulas used in establishing hourly charges, it shows up even more clearly in attempting to break down operating costs. The first confusion arises from the coexistence of sole ownership firms, partnerships, and corporations. Owners and partners usually do not pay themselves salaries. They pay everyone else in the firm, pay all the bills, then they take what is left as their own personal income. In corporations the owners pay themselves a salary and in addition take out dividends from the profit. This means that it is impossible to compare corporations and partnerships unless salaries and profits are taken together as one item. Even this is unsatisfactory if many corporations fail to distribute a large part of profits.

On the other hand, type of ownership has no effect on most items of operating cost. There is no reason a corporation should differ from a sole ownership or a partnership in the percentage of income spent for engineering materials, office space, or office equipment, for example. Therefore, these averages, as shown in Table 1, should serve as a guide to any firm.

While the variations in types of organization make it impossible to establish a reliable figure for percentage of income going to salaries, one question on the survey approached this from a different angle. If the amount allocated to employees' salaries is broken down into the several categories, we get the results shown in Fig. 3. Here again, some owners and partners consider themselves on the payroll, while others do not, but despite this there remains a relationship between the other categories of employees that can be used as an accurate guide to average practice. This relationship, with owners, partners, and principals eliminated, is shown in Fig. 3.

Later Studies

This report, along with the report published in January, provides a portrait of the profession as a whole. In later months the study of the survey will be continued, separating the several branches of the profession and analyzing each separately. These smaller and more particular studies will provide detailed and specific data for civil, mechanical, electrical, structural, and other branches of the profession. ▲▲

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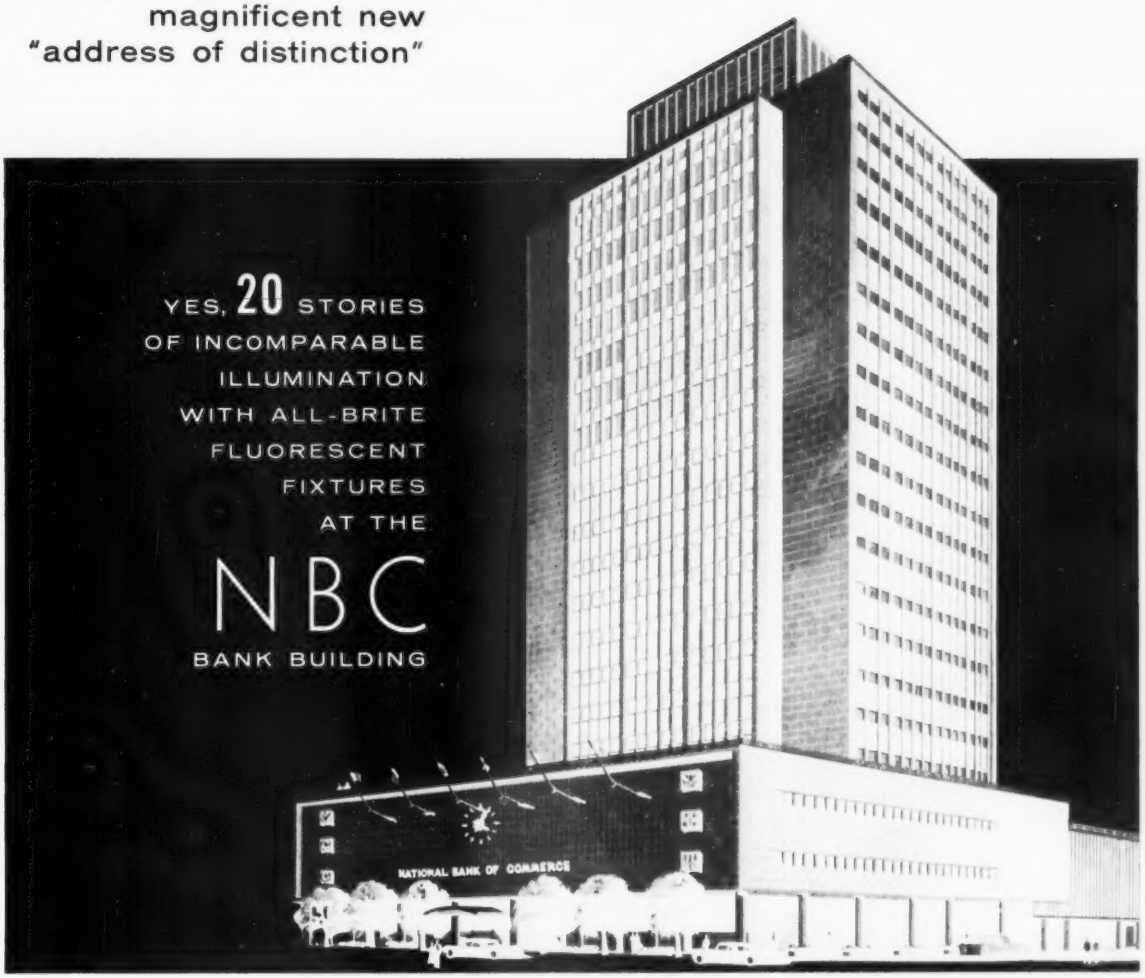

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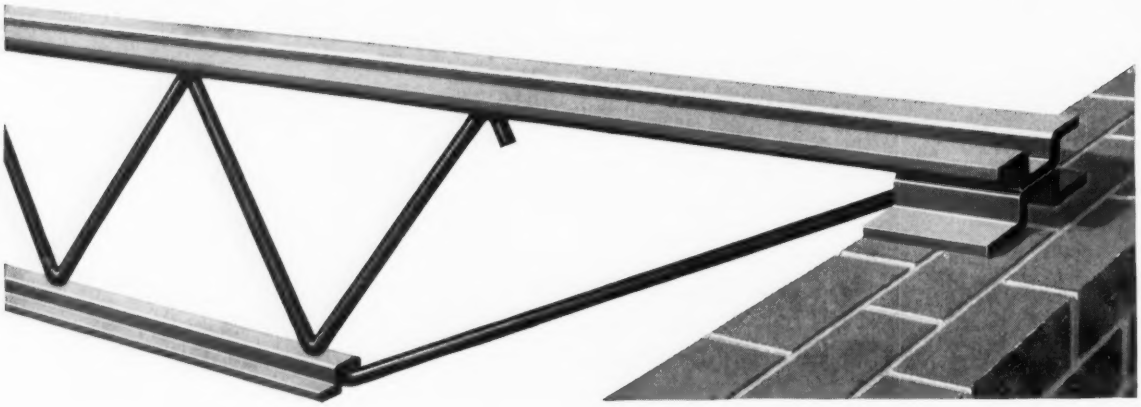

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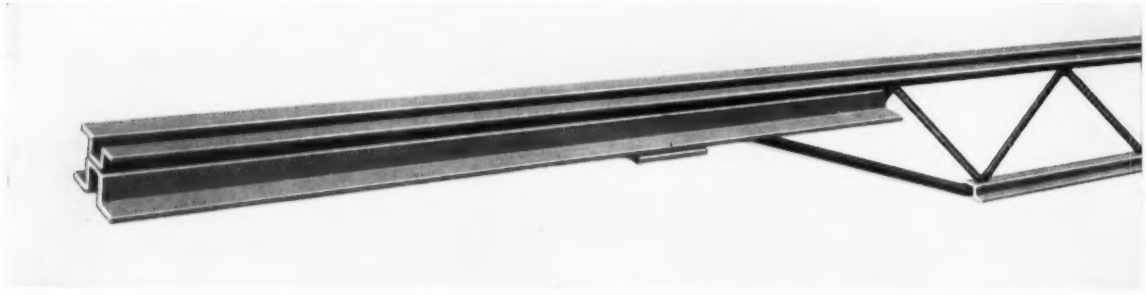

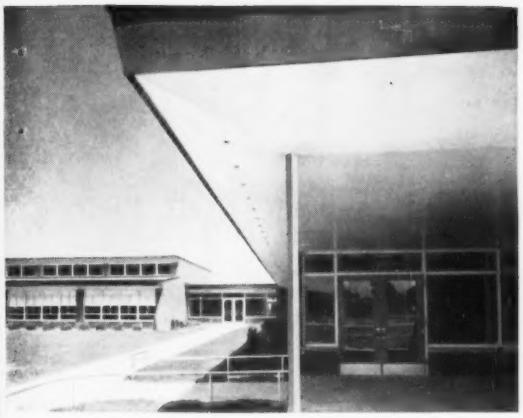

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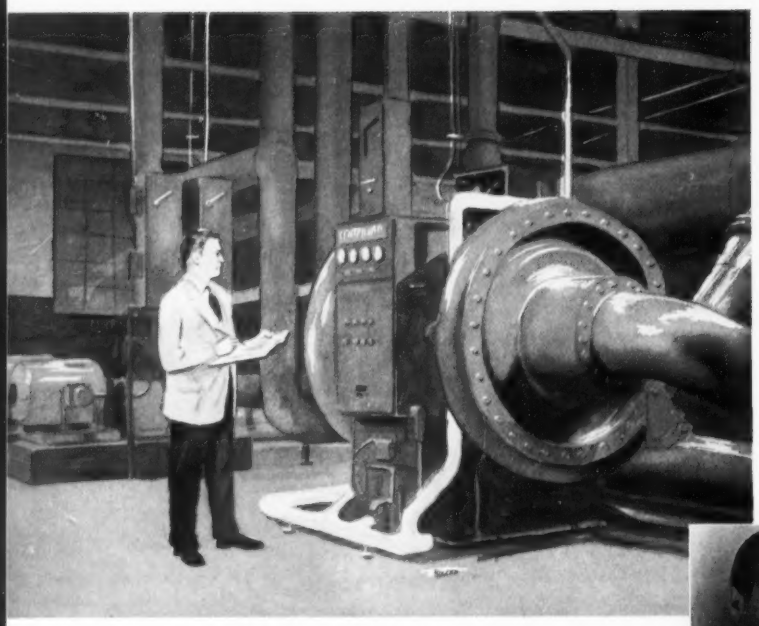

When Should You Recommend Equipment Leasing?

CLARENCE C. KANE
Vice President
United States Leasing Corp.

LATELY, MORE AND MORE firms retaining consulting engineers ask for financing information along with the design for proposed construction. While, strictly speaking, finance is a management rather than an engineering problem, the engineer who can suggest solutions to those problems has a better chance to turn a prospect into a client and to bring his designs to fruition.

When it develops that equipment costs far exceed the anticipated budget (which normally is based on the capital available to the company for investment), the consulting engineer often is faced with a dilemma. He may insist on his proposal, regardless of costs involved, or he may trim his well-conceived program to match the client's current ability to invest in the project.

An Alternative

A third answer, which avoids both of these unhappy choices, is being used increasingly, especially now that tightness of working capital appears to be chronic in many industries. This answer involves equipment leasing. This is not a matter of leasing a sump pump, a fork truck, or any other specific piece of equipment for a brief period. Rather it is a method of leasing for a long term (three years or more) the components of a department, a division, or a whole plant. It is an answer that lets a strong firm get essential equipment without cutting into liquid working capital.

For the consulting engineer, a knowledge of the how and why of equipment leasing sometimes may prove to be the extra, the additional talking point, that enables him to carry out a proposed project to a satisfactory conclusion.

One Example

The difference that equipment leasing can make to a firm's financial picture, as well as the advantage it offers, is illustrated by the example of a metal products manufacturer whose sales and profits had jumped rapidly. To handle the increased volume, the company expanded its plant facilities, but in the process too much working capital was used and the company found itself in a tight position.

The company solved its problem by selling $500,000 of its plant equipment to a leasing company, then leasing this same equipment back at $10,417 a month rent for 60 months, or a total of $625,000.

For this $625,000, the company reduced its liabilities by $450,000 and added $50,000 to its cash balance. (The transaction reduced its assets by $500,000.) Current working capital requirements were well satisfied. The before and after balance sheets for the company are shown in Table 1. (It might be mentioned that the accountant properly footnoted the balance sheet disclosing the sale and leaseback transaction and the amount of lease rental payments due that year.)

The same balance sheet results could have been achieved if the company had leased the equipment to begin with, thereby eliminating the trouble of buying it first and then going through the purchase-back transaction.

Not a Panacea

Leasing is no cure-all, no easy solution to the many financing problems of business, but leasing does have certain benefits. Unlike other financing, leasing involves no dilution of ownership or control; it necessitates no periodic cleanup of funds or pledge of receivables. Ordinarily, only the lease rental payments due within one year will appear on the balance sheet. The portion due beyond one year usually will appear only as a footnote.

One point should be stressed: leasing is no solution for the weak or marginal company. It is a solution only for firms with a first-class credit rating. To qualify for a long-term equipment lease, a company must have the same credit standing it would need to obtain that same amount from a bank.

TABLE 1—BALANCE SHEET

	Before	After
Assets		
Cash	$ 30,684	$ 80,684[1]
Accounts Receivable—Net	345,508	345,508
Inventory	703,292	703,292
Current Assets	$1,079,484	$1,129,484
Fixed Assets—Net	$1,033,232	$ 533,232
Other Assets	119,896	119,896
Total Assets	$2,232,612	$1,782,612
Liabilities		
Notes Payable—Banks	$ 271,776	$ 171,776[2]
Accounts Payable	360,036	160,036[3]
Other Payables & Accruals	235,484	85,484[4]
Federal Income Tax—Estimated	92,000	92,000
Current Liabilities	$ 959,296	$ 509,296
Capital		
Common Stock	$ 230,408	$ 230,408
Earned Surplus	1,042,908	1,042,908
Total Capital	$1,273,316	$1,273,316
Total Liabilities & Capital	$2,232,612	$1,782,612
Working Capital		
Current Assets	$1,079,484	$1,129,484
Current Liabilities	959,296	509,296
Working Capital	$ 120,188	$ 620,188
Current Ratio	1.13	2.22

1. Cash increase: $50,000
2. $100,000 bank debt repaid
3. $200,000 applied to payables
4. $150,000 applied to accruals

Why Lease?

The major argument for leasing is that it permits expansion of plant and equipment while freeing company working capital for expanding sales efforts, for taking all trade discounts, for building balanced inventories to meet seasonal needs, for making more credit available to customers, and for expanding research and development; in short, for all the customary uses of working capital.

The trend in industry is so markedly in the direction of leasing (volume is increasing by better than 20 percent annually) that consulting engineers should know how leasing works and why some companies lease their equipment. Case studies are no help to a specific company; each situation must be examined in its context.

Leasing is Not Complicated

There is nothing complicated about leasing. The company determines exactly what equipment it wishes to acquire, its cost, the suppliers, and the tenure of the lease desired. Leases can be written on straight line, declining balances, sum of the digits, or any other schedule tailored to suit the lessee's requirements. Lease plans are arranged from 1 to 10 years, and renewal options are available for extended periods.

Total cost of the lease is the original cost of the equipment or facility ($500,000 in the example of the metal products manufacturer) plus a moderate leasing charge ($125,000 in that example) for the term of the lease. Through leasing, it is possible to finance expansion or moderization without dependence on or interference with a company's established banking connections or lines of credit, since only the lease payments due within 12 months appear as a liability on the financial statement.

In addition, where equipment from a number of different suppliers is required, leasing combines all the transactions in a single deal covered by the regular single monthly payment to the leasing company, no matter how many suppliers are involved.

Leasing Versus Buying

But while leasing is simple enough, an even simpler way for a company to acquire new equipment is

to buy it out of its working capital. Yet, despite the fact that this is simpler, some companies prefer to lease their equipment.

The reason is the relative cost. If a company takes $10,000 out of its working capital to acquire new equipment, it obviously is paying something for the use of that money. Since every dollar of working capital has earning power, the investment of $10,000 in new equipment must return to the company at least the same profit the company could earn with the $10,000 in other ways. This applies even more to firms in a temporarily tight position for working capital. It is also true that this profit test is one that a consulting engineer's proposals must pass.

Average Earnings

Just how much does a company earn on its working capital? Table 2 shows that net profit on working capital after taxes for manufacturing industry (excluding soft goods) ranges from 10 to 42 percent, with the median being 19.92 (*Fourteen Important Ratios*, Dun & Bradstreet, 1958). For purposes of illustration, a 20 percent net profit figure is satisfactory. Generally, however, any company earning 12 percent net profit on its working capital can benefit from leasing.

It is important to remember that the 20 percent refers to profits after taxes. Since all of the corporations referred to in the profit data are in the 52 percent bracket, the profit before taxes on net working capital is approximately double the figure cited.

TABLE 2—NET PROFIT ON NET WORKING CAPITAL

Line of Manufacturing Business	*Percent*
Airplane Parts & Accessories	17.37
Automobile Parts & Accessories	15.18
Bakers	19.26
Bolts, Screws, Nuts, & Nails	17.79
Chemicals, Industrial	23.78
Contractors, Building & Construction	16.71
Drugs	25.69
Electrical Parts & Supplies	18.17
Foundries	21.78
Furniture	10.54
Hardware & Tools	16.35
Machine Shops	21.72
Machinery, Industrial	16.78
Meats & Provisions, Packers	19.92
Metal Stampings	19.19
Paper	34.76
Paper Boxes	20.16
Petroleum, Integrated Operators	42.04
Printers, Job	22.87
Steel, Structural Fabricators*	20.24

*Sell on short terms

***Fourteen Important Ratios*, Dun & Bradstreet, 1958.**

In short, the typical manufacturing company, according to Dun & Bradstreet, earns, before taxes, about 40 percent on its net working capital.

Where it is necessary for a consulting engineer to make financing recommendations, he is faced with a relatively simple problem. If the company uses its own working capital to buy new equipment and if that capital, plowed back in the business, can earn 40 percent before taxes (or 20 percent after taxes) then the company, by buying, is paying 40 percent for the money tied up in equipment. This is without regard to the effect of depreciation.

The same Dun & Bradstreet report shows that working capital turns over approximately five times a year. This is a median figure for manufacturers. Some industries do better; others do not do so well. Obviously, if working capital turns at all, it should mean earnings.

It is important, therefore, for a consultant to examine his client's ratios to see how often the company's working capital turns, and precisely what investing its own working capital in equipment would cost. If leasing costs less than the company's use of its own working capital, then certainly it is sounder to use leasing. If not, it is sounder to buy.

Comparative Costs

Now let us look at leasing in terms of comparative costs with other forms of financing.* There are three alternatives to leasing:

¶ Outright purchase of the equipment for cash
¶ Purchase through a conditional sales contract
¶ Purchase through a bank loan

Each alternative should be examined for cash flow and net return over a period of years. For purposes of making a simple comparison, take a seven-year period—a common leasing term.

Assume a company needs $100,000 worth of equipment and the firm earns the average rate of profit (40 percent before taxes) on working capital. The standard terms for conditional sales contracts and for bank loans are taken from actual agreements, as are the lease terms.

Comparing leasing with alternate methods of financing, in every instance leasing provides the company with a cash excess – that is, funds not spent on equipment which could be used in the business to earn profits – over the other financing methods in the early years of the seven-year transaction. It provides a cash excess in the first four years over outright purchase for 100 percent cash;

*A full study on the value of leasing has been published by the Foundation for Management Research. Entitled "Leasing and American Industry," this study analyzes the various methods of financing in detail. Copies of this study, with complete statistical tables, may be obtained free from the Foundation for Management Research, 121 W. Adams St., Chicago 3, Ill.

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it provides a cash excess for the first four years and for the sixth and seventh years over a conditional sales contract; it provides a cash excess for the first five years over a purchase financed by a bank loan. In the other years the situation is reversed.

However, at the end of the seven-year period, leasing provides a business with greater net earnings after taxes than any of the three alternative methods of financing.

If the company leased the $100,000 worth of equipment instead of buying it for cash, the company would be about $50,000 net profit ahead at the end of seven years, if the working capital which did not go into the equipment could be used in the business to earn 40 percent profit. If this extra capital could not earn 40 percent profit, the picture would be entirely different, of course.

The company could buy this equipment on a conditional sales contract. Comparing costs, we find that through leasing the company would gain around $20,000 in larger net profit after taxes at the end of seven years, again if the extra capital could earn 40 percent profits.

Finally, the company could finance the equipment through a bank loan. By leasing, the company would gain around $10,000 more net profit after taxes over the seven-year period, if the capital could be invested in the company and return 40 percent profit.

This example deals with averages and typical conditions. No two companies have the same situation and a consultant should examine the particular condition of his client and the company's earnings ratios on working capital to decide which method is best to finance the purchase of new equipment. What holds true for $100,000 holds true for any fraction or multiple of this amount.

Other Advantages

Nothing has been said about the tax advantage in leasing. Actually, the advantage of a lease arrangement lies principally in the way it frees dollars, otherwise invested in ownership of fixed assets, for more profitable uses. In some special situations, leasing does offer a tax advantage, but each company has to be studied to see if those special circumstances exist.

Leasing offers other possible advantages – but again only in special situations. Some companies would like to convert fixed assets into current assets. This may be accomplished by selling the asset for cash and immediately leasing it back.

Other companies are faced with a competitor using the latest equipment, while their machines are outmoded. Acquiring new machinery is a must, but financial ratios may not permit outright purchase, purchase on a conditional sales contract, or even bank borrowing. Leasing offers a tested expedient to accomplish the end desired.

Still other companies hold a tight checkrein on capital expenditures and financial ratios, although the president or division manager may feel it mandatory that certain new equipment or facilities be installed. Even if the equipment is purchased on a credit plan, it decreases the ability of the concern to borrow in other directions. Leasing a fixed asset has a similar but partial effect, for only the much smaller annual rental is involved. As a result, leasing meets the problem of the tight checkrein on capital spending or financial ratios without forcing the board of directors to raise more capital.

Some companies do not want a large investment in equipment when there is a strong possibility of rapid obsolescence. Leasing bypasses this problem, permitting a user to acquire the latest and best on a short-term lease.

A Hedge Against Inflation

Inflation has brought new problems to corporation treasurers' offices. For many years, corporations have rented real property, but insisted on purchasing machinery and equipment. As a result of inflationary pressures, industrial real estate not only has held even, but actually has enhanced its value in most instances. On the other hand, machinery and equipment always depreciate in value as they wear out.

If the corporation expected to spend $2 million on plant and a like amount on equipment, it might be wiser to buy the real property and lease the equipment. Many corporations find that inflation makes them readjust their thinking about which fixed assets should be purchased and which leased.

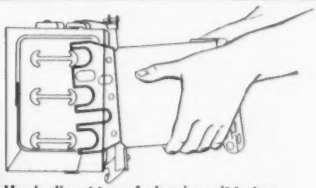
Finally, the desire to maintain business liquidity has led many companies to lease instead of buy. According to the Securities and Exchange Commission, the ratio of "quick assets" to current liabilities for all manufacturing industry stood at 1.23 in the first quarter of 1958, virtually the same as the ratio for 1939 and below the ratios of 1945-50. This decline of liquidity is in part due to the impact of Federal tax legislation for a speed-up of corporate tax payments. It is also partially due to the greater demand for credit by business customers. Whatever the cause in any particular business, this general decline in liquidity provides one strong explanation of the increase in leasing activity.

Of course, the consulting engineer should encourage his client to go over the situation with a CPA or a tax lawyer before reaching a decision. But where it fits, leasing can permit a client to go ahead with a plant expansion or modernization that he could not otherwise afford. ▲▲

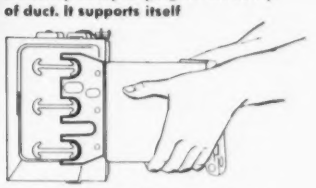
Another Reason for Using Square D Aluminum Plug-in Duct...

SQUARE D PLUG-IN UNITS GIVE YOU EXCLUSIVE *hook-swing* MOUNTING

Safer, Faster, Easier Mounting



Hook clip at top of plug-in unit to top of duct. It supports itself



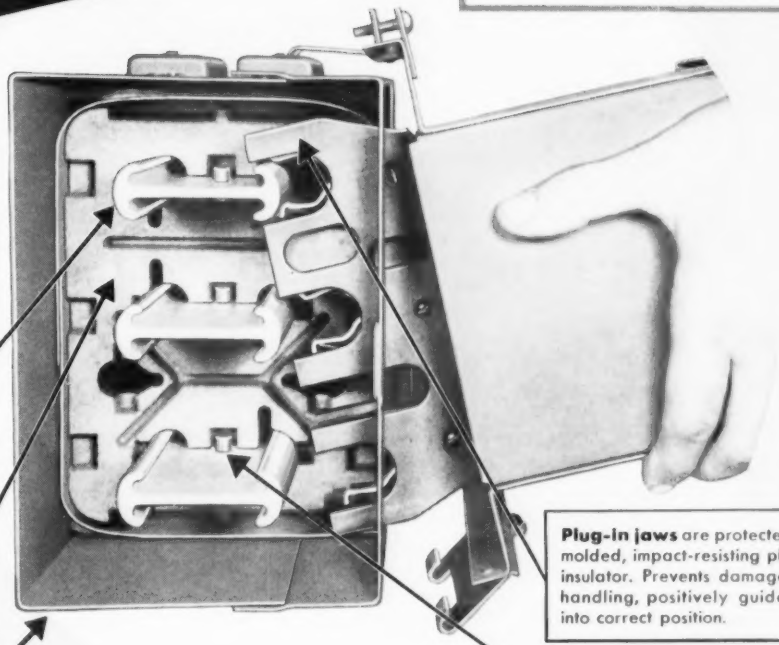
Then, just swing plug-in unit down until jaws engage bus bars

Hanger mounting (*not shown*) makes installation easy. A universal hanger permits mounting in *any* position. Just suspend and level top portion of hanger, then clip on lower portion. U.L. approved for 10-foot spacing.

I-beam construction of bus bars—a Square D exclusive—provides four times the strength of conventional bus bars. Bars are zinc, copper and silver-plated full length.

Full width bus support provides greater strength on short circuits, freedom from vibration. Also acts as fire stop where duct passes through walls and floors.

Square D duct is totally enclosed for maximum safety—no danger of accidental shorts. Prevents overheating from dust accumulation.



Plug-in jaws are protected by a molded, impact-resisting phenolic insulator. Prevents damage from handling, positively guides unit into correct position.

Steel pins in each bus bar prevent bars from shifting and support them on vertical riser installations.

With other plug-in duct, it's no easy job to mount the plug-in units. In fact, it takes a lot of real pushing which is neither safe nor easy when you're working on a ladder. With Square D's exclusive *hook-swing* mounting, you just hook the plug-in unit to the top of the duct. Then, simply swing it down and in until the jaws have engaged the bus bars. No awkward pushing required—no unnecessary chances to take.

Square D aluminum plug-in duct with exclusive *hook-swing* mounting costs no more—why settle for less?

Write for Bulletin SD-110. It gives the facts on Square D aluminum plug-in duct. Address Square D Company, 6060 Rivard Street, Dept. SA, Detroit 11, Michigan

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

This eye-pleasing prestressed concrete bridge in Highland Park, Illinois was erected quickly and economically.

Designing Small Span Bridges

HAROLD F. SOMMERSCHIELD
Suter & Sommerschield
Architects & Engineers

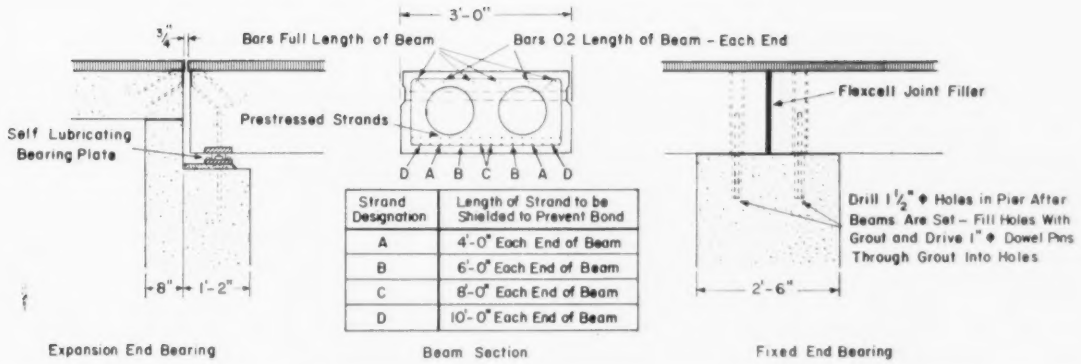
Harold F. Sommerschield is eminently qualified to write on the subject of prestressed concrete bridges since his more than 25 years of diverse structural engineering experience includes an appreciable amount of time in the consulting engineering field. A civil engineering graduate of the Armour Institute of Technology, Mr. Sommerschield was first a mechanical draftsman for the Youngstown Sheet & Tube Company in 1924. He then spent 3 years with Sargent & Lundy, and was successively employed by V. D. Simons and Roberts and Schaefer. In 1930, he joined Harza Engineering Co., remaining with this firm for 15 years. Mr. Sommerschield also has served as Structural representative of the Portland Cement Association. In 1954, he entered into partnership with W. Lindsay Suter, A.I.A., forming the architect-engineer firm of Suter & Sommerschield. He has served as president of the Chicago Chapter of ISPE and the Illinois Section of ASCE, and is also a member of ACI. He is a registered professional engineer in the states of Illinois and Iowa.

INDIVIDUALLY DESIGNED and constructed small span prestressed concrete bridges can be built economically and speedily for city streets and secondary roads in communities, townships, and counties. A recent engineering evaluation of this type of construction by our firm has shown it to be desirable for these uses although until now prestressed bridges have been used in this country mainly on long spans and where numerous structures were needed.

When four bridges had to be replaced in the City of Highland Park, Illinois, a suburb of Chicago, our firm considered many factors, including costs and estimated delivery dates. We found casting yards in the area equipped to turn out shallow prestressed box-girders at competitive prices and contractors experienced in this type of work.

Solution to Design Problem

When we approached the problems of their design, we decided, for aesthetic reasons, to hold the depth of deck units to a minimum thickness. The casting yard, we found, had standard forms for 17-in., 21-in., and 27-in. units. Investigation indicated the


3'-0"
¾"
Bars Full Length of Beam
Bars 0.2 Length of Beam - Each End
Prestressed Strands
Self Lubricating Bearing Plate
D A B C B A D
8"
1'-2"
Flexcell Joint Filler
Drill 1½" ϕ Holes in Pier After Beams Are Set - Fill Holes With Grout and Drive 1" ϕ Dowel Pins Through Grout Into Holes
2'-6"
Expansion End Bearing
Beam Section
Fixed End Bearing

Strand Designation	Length of Strand to be Shielded to Prevent Bond
A	4'-0" Each End of Beam
B	6'-0" Each End of Beam
C	8'-0" Each End of Beam
D	10'-0" Each End of Beam

Details of box-girder supports and shielding method used to prevent a bond between prestress strands and concrete.

17-in. depth met all requirements except the specified limitation as to tensions in the top of the units near the supports. Our problem, then, was to find some way to reduce this top tension in the concrete. We decided to investigate the effects of encasing some of the stressing strands in paper tubes near the supports. By shielding some of the strands at the ends, thereby avoiding bond between strand and concrete, we managed to get the prestressing desired in the center of the units while reducing the stress at each end. In this way, we came up with a design for a bridge deck unit that is relatively thin and yet meets all specification requirements.

Stepped Shielding

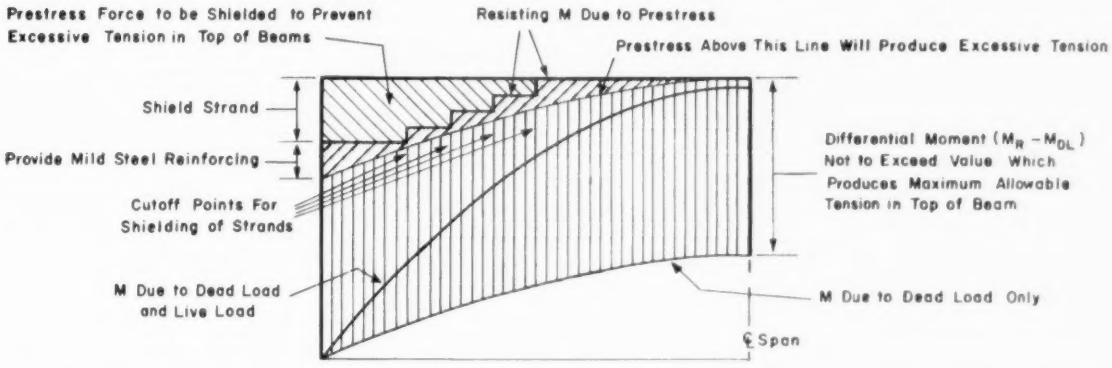
Details of this shielding are shown on the cross section drawings of the deck units. Note that strands marked A are shielded for 4 feet from each end, B strands are shielded 6 feet, C strands 8 feet, and D strands 10 feet. The moment diagram shows the effect this shielding has on the prestressing forces. Instead of a rectangular moment diagram, we have a stepped diagram. The differential between the resisting moment and the dead load moment is thereby held within limits which will prevent tensions in the top of the beams that are in excess of the specified amounts.

Within each girder, two 10-in. diameter Sonovoid tubes were run full length (except at diaphragms and end blocks to reduce dead weight of the deck units. Each deck unit was 3-ft wide and designed to support an AASHO-H20 loading while conforming to the Bureau of Public Roads "Criteria for Prestressing Concrete Bridges."

Bridges Are Erected Fast

For simplicity, all of the bridges were designed for nominal 40-ft spans, and as a result, the cost of the deck was quoted at $8 per square foot, which included production, erection, grouting, and transverse tensioning.

The four bridges were built in about 200 working days and opened to traffic June 1, 1958. Three of these bridges have three spans and one has four. Only one of the bridges is straight, the others having various degrees of curvature. Piers and abut-


Prestress Force to be Shielded to Prevent Excessive Tension in Top of Beams
Resisting M Due to Prestress
Prestress Above This Line Will Produce Excessive Tension
Shield Strand
Provide Mild Steel Reinforcing
Cutoff Points For Shielding of Strands
M Due to Dead Load and Live Load
Differential Moment ($M_R - M_{DL}$) Not to Exceed Value Which Produces Maximum Allowable Tension in Top of Beam
M Due to Dead Load Only
℄ Span

Stepped moment diagram shows how the selective bond reduces tension in upper portion of girder near supports.

Smooth roadway curvature was obtained by using curved curb-sidewalk units. Deck units are straight.

ments were set on radial lines with straight bridge deck units connecting them. The curvature of the roadway was achieved by curving the 3½-ft curb and sidewalk units which cantilever out from the edges of the deck.

Construction Techniques

The specifications were simplified, permitting any contractor experienced in highway construction to build these structures with no greater difficulty than with the use of conventional methods. In fact, a faster schedule than usual was possible because work was carried out simultaneously on the piers and abutments at the site and on the girders at the casting yard.

Extreme care was taken to obtain a consolidated, watertight, and durable concrete. The hammerhead piers were erected in a conventional manner, using Plastiment concrete so as to obtain maximum density and to facilitate placement. This was an important aspect of the specifications for the earlier bridges had to be replaced because of disintegration of the concrete. Careful construction supervision assured the fulfillment of the specifications regarding internal vibration, proper placing, minimum cement factor, use of the retarding-densifier, and 3-5 percent air entrainment. The retarding densifier was specified to take care of anticipated delays in delivery. It kept the cast concrete from setting, thereby preventing cold joints between pours. Each successive pour was welded to the

Specification Details

Precast Deck Units

Concrete strength of 4000 psi

A minimum of 6½ sacks of Portland cement per cubic yard, and a maximum of 5½ gallons of water per sack of cement

A slump of 3 inches

An entrainment agent to yield 3-5 percent air content (6 ounces Darex AEA per cubic yard)

4.9 pounds of Plastiment per cubic yard (¾ pound per sack of cement)

Properly graded aggregates including 1-in. maximum coarse aggregate and sand of a consistency so that an average of 6 percent will pass a No. 100 sieve

Prestressed elements — ⅜-in. diameter 7-wire strand to provide :
Minimum ultimate tensile strength—250,000 psi
Initial stress (held for 2 minutes)—175,000 psi
Tensioning stress, at release —160,000 psi

Transverse prestressing—¾-in. diameter Stressteel rods, post-tensioned to 85,000 psi. Minimum ultimate strength of rods—145,000 psi

Cast-In-Place Concrete
Piers, Abutments, and Sidewalk Slabs

Concrete strength of 3500 psi

A minimum of 6 sacks of Portland cement per cubic yard, and a maximum of 6 gallons of water per sack of cement

4½ pounds of Plastiment per cubic yard

6 ounces of Darex AEA per cubic yard

Maximum coarse aggregate of 1½-in. crushed stone and sand with a fineness modulus of 2.86

Specifications for cast-in-place concrete abutments included retarding-densifier, 3-5% air entrainment.

Prestressed concrete deck units, weighing 10 tons, were placed with outrigger-equipped truck crane.

previous one by vibration, assuring homogeneous concrete in the piers and abutments.

Girders were erected rapidly by truck cranes. Using outriggers, the crane positioned each 40-ft long girder over its span, lowering it into position. Each girder weighed 10 tons. When one span had been completed, the truck advanced onto it to place subsequent spans.

Deflections under erection loads were checked and found to be a maximum of ⅞ inches when the loaded truck was on the span while placing girders. The only precaution taken was to be sure that each of the truck's dual wheels was properly positioned on two girders. It was found that three or four spans can be placed easily in one day.

The bridges were built around curves, necessitating special lengths for each of the ten deck girders, as those on the inside of the curve are shorter than the outer ones.

Surface Course Laid Directly on Girders

After the deck units were positioned, their dovetail keys were grouted. When hard, the transverse rods, at the 1/3 points and at each end, were post-tensioned. Sidewalk slabs then were placed, and a 2-in. Class I, Subclass I-H bituminous concrete surface course was laid directly on the deck units.

Reinforced concrete approach slabs, of typical design, are 10-in. thick and 20-ft long. They rest on the abutments and provide a smooth transition between the bridge deck and the adjoining streets.

The tops of the piers are raised slightly above the abutments, to accommodate the small camber in the prestressed deck units and to provide a smooth vertical curve. A crown of 1½ inches was produced by sloping the tops of piers transversely. The combination of crown and camber facilitates adequate drainage through scuppers set into the sidewalks at the one-quarter points of each span.

Deck unit bearings at piers are fixed. At abutments, self-lubricating bearing plates permit freedom of expansion.

The batter of all piers was held constant and only two widths of hammerheads were used to permit maximum reuse of forms. Pier heights varied up to 45 feet.

During cold weather construction, the structures were heated with salamanders and protected with Visqueen plastic sheets, and the mixing water and aggregates were heated.

Compression test cylinders of cast-in-place concrete were stored in a cold warehouse (to simulate actual field conditions) and were broken regularly to assure compliance with specifications. Results showed that the required minimum strength of 3500 psi in 28 days often was reached in 7 to 14 days. Tests indicated 4 to 5 percent air content.

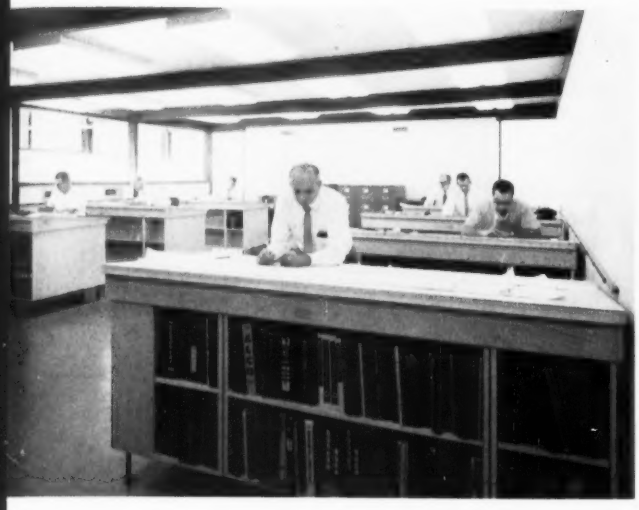
Design Fulfilled Expectations

Our experience in the design and supervision of construction of these four bridges proved to us that designs of this type are excellently suited to spans of this nature, that they can be economically and rapidly erected, and that precast decks are competitive price-wise.

Perhaps most interesting of all, and most important to future designs, we found that we can make use of a thin box girder design by the use of shielding to reduce the pretensioning forces. It would seem that the application of this design principle might be used in many instances to prevent the high tension stresses in the top of prestressed units near the supports where the effect of the dead load moment is practically nil. ▲▲

Modernistic building facade faces due north. Front entrance to second level and view showing plywood-panel sun baffles along eaves are shown on opposite page. Below is Holladay & Westcott's new drafting room.

An Office Building Designed for Engineers



A NEW GROUPING of professional offices is developing along Colorado Street in the Los Angeles suburb of Eagle Rock, in the foothills of the Sierra Madres. These offices look out across the Colorado Freeway to the wooded mountain slopes surrounding the famous rock with its curiously shadowed overhang resembling a soaring eagle.

CE exclusive

All Occupants CE Firms

The newest addition to this professional center is the office building built by Ralph M. Wescott, of Holladay & Westcott, consulting mechanical engineers, for occupancy by his own and four other engineering firms: Wheeler & Gray, structural engineers; Helin Engineering Co., electrical engineers; Johnson & Nielsen, structural engineers; and Case & Gregory, civil and structural engineers, who joined

the group when the new building was nearing completion. All these firms are members of the Consulting Engineers Association of California.

Advantages of the Location

The advantages of the location are many: its proxmity to the homes of the participating engineers; the climate, milder by several degrees than that of the general area's average; a much less severe smog problem; and ample parking space. Yet Pasadena and Los Angeles are only five and ten minutes away by freeways.

However, the site itself presented several problems: originally it had been a small draw into which an early alignment of Colorado Street curved. As Colorado became an important boulevard and eventually a freeway, the old alignment was filled with debris from the excavation for an adjacent aqueduct. This produced a salvaged building lot with a rear to front drop of about 15 feet, filled to a depth of as much as 30 feet in some places.

On this perplexing site, acquired at a reasonable price, Holladay & Westcott needed 1500 square feet of space for themselves and an additional 5000 for the other firms. Holladay & Westcott required for themselves a reception area, four private offices, and a drafting room with 100 square feet allowed for each of 8 to 10 draftsmen.

At this point, Smith and Williams, architects for Ralph M. Westcott, were called in to help solve the problems of site planning and architectural design. The first step in the solution involved placement of parking at the top level of the site, just off an access alley, thereby eliminating the necessity of providing driving lanes within the boundaries of the property.

Two-Level Structure for View, Economy

To benefit from the site's view, it was decided to place the premium office space high off street level in a second story. Instead of designing enclosures at ground level as retaining walls, as would have been necessary in basement construction, it was found to be less expensive to excavate the embankment and install perimeter windows all around. Excavated material was used to build up the remainder of the property to a gentle slope far more suitable for use as extra parking space. Two of the major offices have been located on this ground floor. Lavatories have been centrally placed on the first level, along with mechanical equipment. Space remains for a conference room and library

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which also provides an area for temporary expansion available to all offices.

From the upper parking level a bridge extends to a point midway between first and second floors where the rear entry is staged. Broad, low-rising stairs then lead to foyers on both floors. These foyers run through the width of the structure and combine the functions of lobby, hallway, and reception room for all suites. This arrangement not only saves space but reduces the number of receptionists required.

Street access to office suites on the second floor is by means of a stairway at the front entrance. This stairway is screened by a large panel on which are listed the names of the tenant engineering firms. Carefully planned landscaping adds to an atmosphere designed to extend a friendly welcome.

This combination of solutions resulted in a saving of 5 percent of the space usually reserved for interior community and circulatory areas, ordinarily figured at 20 percent. The building contains 9200 square feet of which 85 percent is working space.

The problem of anchoring the structure to solid ground was solved by setting 21 caissons on bell footings at depths varying from 8 feet to 40 feet. Steel columns rise from the caissons to the second floor and carry wood columns to the roof. The steel structural system made it possible to eliminate the need for interior bearing walls and yielded a completely flexible interior in which to plan office partitions that may be changed easily.

Air Conditioning

Against the low winter sun, a system of plywood panels has been arranged along the eaves as a baffle protecting windows of the second floor and cutting glare from surrounding pavements. As an aid in the reduction of interior summer temperatures, the roof receives a cooling spray from sprinklers, and in order to divert excess runoff from entering sewer or storm drains (prohibited by law), two 8-ft dry wells have been sunk to return the water directly to the ground. The building is fully air conditioned and sealed against outside air. It has been realized since that this sealing may have been a mistake. If it were possible to use outside air when temperatures are comfortable, a condition often prevailing in Southern California, the air conditioning system operating cost would be reduced substantially.

One interesting aspect of this building is that the owner and tenants were the design engineers. Holladay & Westcott handled the mechanical, Wheeler & Gray the structural, and Helin Engineering the electrical. As a result the tenants now have the opportunity to live with their own designs while the owner has had the dubious privilege of being both engineer and client on a project. ▲▲

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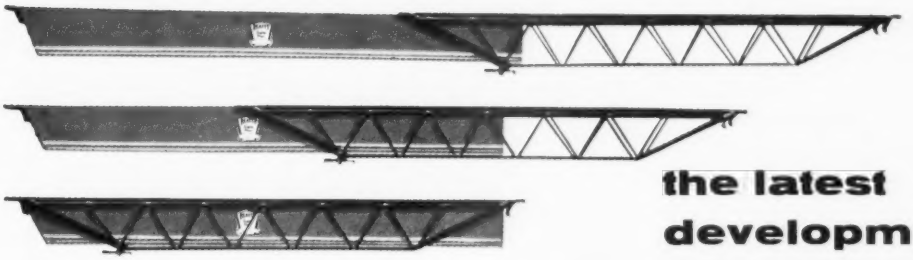

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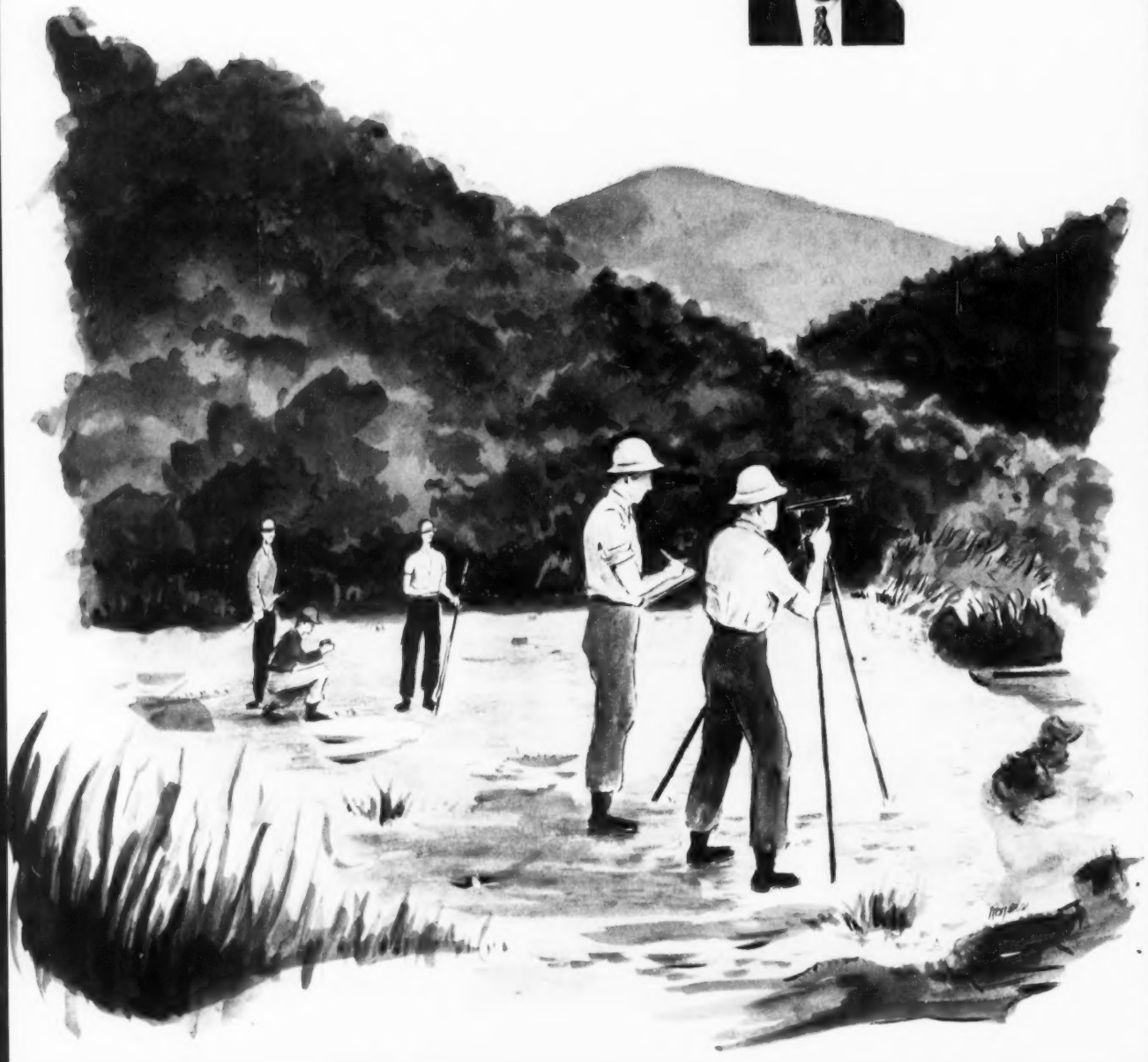
We Surveyed For Coal In South Vietnam

CLAYTON G. BALL
President
Paul Weir Company, Inc.



Clayton G. Ball has broad experience in mapping and fundamental research on coal beds. He spent six years with the Illinois State Geological Survey and was a geologist for an Illinois coal company. In 1943, Mr. Ball was Principal Mining Engineer, Mining Equipment Division, of the War Production Board. He holds a B. S. degree from Northwestern University (1928), and M. A. (1931) and Ph. D. (1935) degrees from Harvard University. Mr. Ball is a member of the American Institute of Consulting Engineers, a Fellow of the Geological Society of America, and a past president of the Illinois Mining Institute. Previous foreign assignments besides the South Vietnam survey include explorations in Brazil, Chile, Korea, and Turkey.

A PAUL WEIR COMPANY team, composed of Senior Engineers David J. Kachik and Paul R. Eyrich and myself, returned last May from South Vietnam after exploring the mining possibilities and economic justification for developing a coal mine in the Nong Son area some 400 miles north of Saigon, the capital city of the Republic of Vietnam. The project, sponsored by the International Cooperation Administration (ICA) under an agreement to provide assistance to the Government of Vietnam, lasted two months and included studies in remote mountain and jungle terrain rarely or never before seen by Americans.

The village of Nong Son is on the west bank of the Thu Bon river, in the province of Quang Nam, 100 miles south of the line of separation between North and South Vietnam. The nearest major city is Tourane, 40 miles northeast, on the China Sea.

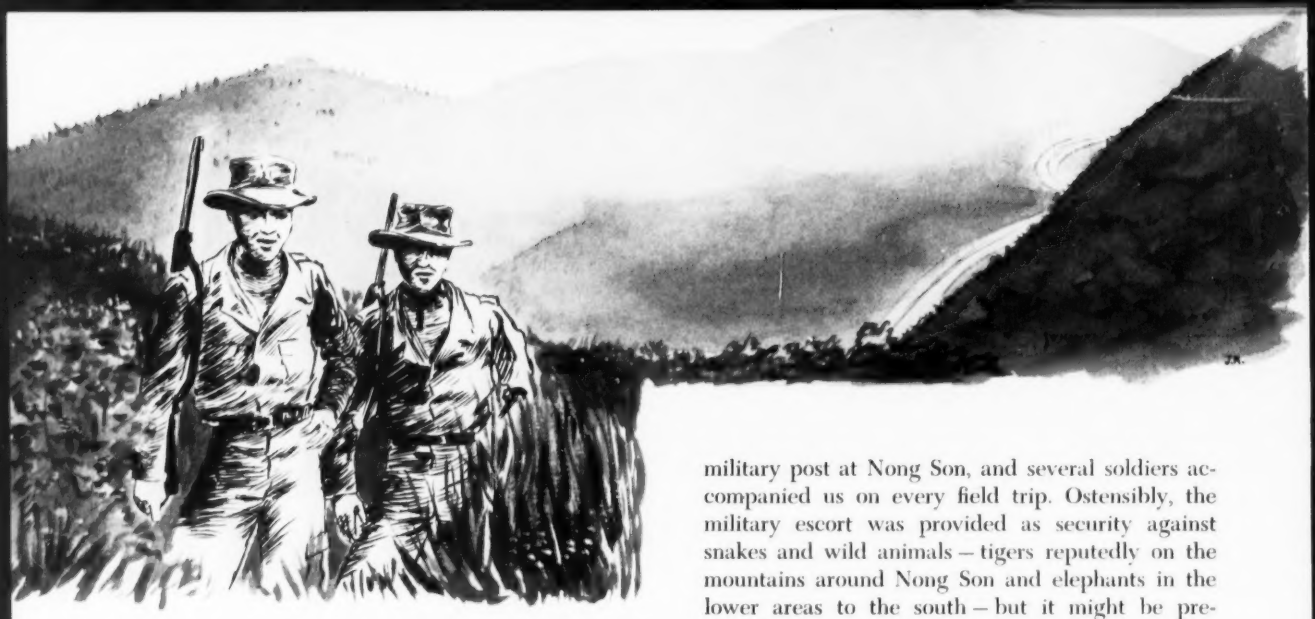
We flew from Saigon to Tourane via Air Vietnam and then drove over the ancient highway which twists and turns from Tourane to Hue, former capital of undivided Vietnam and home of many astonishing memorials to previous kings. This road goes through the Pass of the Clouds, a mountain notch almost continuously shrouded in fog. From Tourane to Nong Son much of the road could only be traversed by Jeep over makeshift structures around bombed-out bridges and across wide rivers by ferry. The road ended abruptly across the river from Nong Son, requiring a crossing by small boat as the final stage of the journey.

Area Interesting

The topography at Nong Son ranges from hilly to mountainous. The village itself is in the narrow flatland and along the river. We learned later that about 10 million of South Vietnam's 12 million people live along the rivers and the seacoast. A short distance from the river the jungle takes over. Except on the mountain slopes, it is not the foreboding, impenetrable forest commonly associated with the term but rather an undulating sea of closely stalked grasses and shrubs rising to heights of 15 feet and more.

Beyond the coastal and riverbank villages, in the hill country, live the Mois, darker in complexion and heavier in figure than the river-level Vietnamese. These tribes, roughly comparable in development to the original American Indians, are self-sufficient, leaving their native villages only occasionally on trading missions. Although a program of extensive geologic mapping of the back country is warranted, no one could be sure whether resistance or cooperation would be encountered. The Paul Weir team skirted, but never worked far into Mois territory.

The south Vietnam government has established a



Army troops accompanied the mission on all of its field trips to provide protection against snakes and animals.

Survey party explored Nong Son area, some 40 miles southwest of Tourane and 400 miles north of Saigon.

military post at Nong Son, and several soldiers accompanied us on every field trip. Ostensibly, the military escort was provided as security against snakes and wild animals – tigers reputedly on the mountains around Nong Son and elephants in the lower areas to the south – but it might be presumed that the escort was also for protection against unfriendly tribes and communist infiltrators.

Mine Development Important

The Government of Vietnam is understandably eager to have their potential mining situation analyzed in order to plan future programs. The coal mine at Nong Son consists of one active area, another area under development, and a network of workings abandoned by a French mining company over 35 years ago.

Our hosts were the director of the Nong Son Coal Mine, Mr. Cao van Ba, and his general manager, Mr. Hoang van Luu. Mr. Ba made every effort to anticipate the team's needs and even gave up his own rooms to provide us with housing. Mr. Luu was the classic mining man of the type found wherever mines and minerals prevail. He was the local authority on minerals and rocks; he knew the locations of every outcrop and ancient grassed-over prospect opening; and he was a veritable encyclopedia of local history. Our interpreters were Mr. Nguyen Ngoc Ho, who, like most American 19-year olds, could not resist trying to operate anything mechanical – he played his harmonica like a virtuoso; and Mr. Pham Dinh Trong, more sedate than Ho, who brought his tiny bride to share the rigors of camp life with him.

There were no records of usable survey points or bench marks in the vicinity of the mine. Data on any control points established or used in previous mine mapping had been destroyed or lost. Dave Kachik, who was responsible for civil and topographic mapping, used an old mine shaft collar as a base point for plotting the terrain. Paul Eyrich evaluated past and existing mining methods and equipment. My chief duty was to establish geologic relationships and mining conditions, though each

of us assisted the others so that the field studies represented a joint effort of the entire team.

Temperature a Problem

The climate, hot and intensely humid along the deltas, coastal plains, and river flats, followed a fixed pattern week after week. The heat and humidity would build up relentlessly for some five or ten days like an onrushing tidal wave and then break with a tropical storm preceded or followed by a day or two of cloudiness. Despite warnings about wild beasts and other dangers, the climate proved to be our most formidable enemy. We each lost around 15 pounds of evidently unnecessary weight but suffered no real, lasting difficulties.

On one exploration the temperature was about 115 degrees in the valley of the village of Tra Linh as brush cutters cleared the way for us along the watercourses. The better exposures commonly are found along and in the beds of the tributary drainage system, overgrown by saw-grasses and reeds. On the return trip I suffered severe cramps in both legs, my first and only experience with this symptom of heat exhaustion. In the evening I soaked for over an hour in the river without caring whatever else, vegetable or animal, also might be present.

Throughout the explorations, we were rewarded constantly with panoramas of natural beauty, some of which probably had never been seen by American eyes. On a trip near Hoang Phuoc, northwest of Nong Son, we climbed to a point some 1400 feet above valley level up steep, densely forested slopes. Here, back of a waterfall cascading from the top of a cliff a hundred feet above us, we studied an exposure of coal in a horizontal niche, approximately 100 yards in length and five to six feet in height, hollowed out between two massive beds of sandstone and conglomerate. The setting more than made up for the arduous climb in the punishing humidity.

Field Trip Procedures

On trips taking us more than a day's journey away from Nong Son, we spent the night in the house of the chief of the nearest village. The chiefs were invariably hospitable and courteous, one of them making a 20-mile canoe trip the next day to return our visit. Some of the villagers and most of the children unobtrusively watched our every move, and I never failed to be rewarded with almost hysterical attention when I inflated the air mattress I laid over their table-like beds.

Vietnamese villagers are avid sports enthusiasts. An afternoon rarely went by without a vigorous soccer or volleyball game by two local teams on a flat field set aside for athletics but also used indiscriminately by the ubiquitous water buffaloes, tended by the tiniest of children, on their way to the river for their nightly bath. With life flourishing along the rivers, it is only natural that even the smallest villages boasted a carefully handmade racing shell and an eager crew. The ancient language of native drums is used daily in traditional months to hurl challenges between villages and to set the pace for the paddlers, but the village wars are between swift boats, not armed men.

As far as we know, we never were threatened by wild animals although on one occasion I had the impression we were about to face all the tigers in South Vietnam. Our destination was an area about 15 miles up the Thu Bon river. An escort of five Vietnam soldiers and their lieutenant started out with us on a motorized barge, and about five miles later the renowned hunter of the region and his son climbed aboard. That evening, after we were lodged in a village chief's house, there was intense preparation among the soldiers and hunters, and both parties left the village. Loud laughter and talk at 2 a.m. ended any thoughts of sleep as the men returned, butchered a wild boar shot by one of the parties, and recounted in detail the misses and near-misses of the hunt. This was clearly an assignment to the taste of military minds. We were offered a slab of boar meat but felt it best to suggest that it be given to some of the villagers whose paddies and fields frequently are damaged by these wild marauders.

Impressions Favorable

After two months of mapping, mine and outcrop observations, drill-hole studies, coal sampling, and detailed conferences, our field mission was completed. It is worth stressing that we never experienced the slightest instance or hint of anti-American feeling at any level. We were encouraged constantly by the friendly and helpful atmosphere encountered with the people of Vietnam, especially those with whom we came into frequent contact — the officers and soldiers who accompanied us for security purposes, the bosses and laborers who assisted in our field activities, and the hospitable chiefs of the outlying villages who often acted as our guides in remote areas.

It was the collective feeling of the Paul Weir Company team that South Vietnam deserves utmost tribute as a nation striving for independence in the democratic manner but facing tremendous obstacles. Outside assistance in stabilizing the fundamental economy of South Vietnam is essential in helping it become a strong member of the brotherhood of free nations. The will is certainly there, but the young nation needs some friendly assistance along the way. ▲▲

Transistorized North American RECOMP II computer, shown above with input-output equipment, is lightweight, rugged.

Small Computers For Small Firms

WILLIAM A. BRIGGS
Burgess & Niple

William A. Briggs received a Bachelor of Civil Engineering degree and a Master of Science degree (1956) from Ohio State University. Before joining Burgess & Niple, where he works principally on hydraulics and hydrology problems, he was with Battelle Memorial Institute and a Second Lieutenant in the U.S. Army Corps of Engineers. Mr. Briggs is registered as an Engineer-in-Training in Ohio, and he is a member of the Association for Computing Machinery.

MANY ENGINEERS associate electronic digital computers with rooms full of imposing grey boxes humming, chattering, blinking, and solving mathematical problems at fantastic, unimaginable speeds. Computational speeds of "100,000 additions per second" or "a multiplication in 25 microseconds" bewilder those of us who have a hard time imagining any problem that would require 100,000 additions at any speed!

There must be such problems, keeping these machines busy for days on end, but they are not the type of problems encountered by most consulting engineers. So our firm's reaction to electronic data processing was simply "it's just not for us."

Then we began to wonder. Is there any equipment for a small consulting engineering firm — equipment that can be had at a reasonable cost. If so, what can it do and how much does it cost?

Computing System Sizes

I define a small scale computer as one that costs between $500 and $3000 per month for rental of the entire system. The word "small" is relative; anyone familiar with some of the very large computing systems probably would consider a machine costing $20,000 per month a small computer. It may be misleading to judge a computer system entirely by cost, since the capabilities and capacity of a machine are the real factors that determine its usefulness. There is, however, an almost direct relationship between cost and capability.

Table 1 illustrates the range of costs of some basic computer systems, large and small, presently

available in this country. This table does not give an entirely adequate picture because basic system costs alone are tabulated; required peripheral equipment costs (which often double the total cost of a system) along with manpower and installation costs are not considered. Small computer costs, however, can be determined quite precisely from Table 1, since these computers are typical self-contained systems with nearly negligible installation costs.

Computer Utilization

The decision to rent, lease, or buy a computer must be based on an analysis of its probable use. Any digital computer can, neglecting time and cost, process any problem that can be formally stated in either mathematical or logical terms. The most elementary programs are those for the calculation of mathematical functions, such as the sine of an angle or the logarithm of a number. These programs are found in the libraries of all organizations using computers, and they usually are called subroutines.

One of the most common uses of a computer is for the solution of sets of simultaneous equations. Any matrix, or set of simultaneous equations, can be very efficiently manipulated within a computer so long as it does not exceed the storage capacity of the computer. A 30 x 30 matrix (30 variables) seems to be about the maximum size practical for small scale computers, although larger matrices could be accommodated by partitioning. Examples of physical systems which can be expressed as matrices include structures, specifically rigid frames; and the distribution of electrical current about a complex circuit or, analogously, of water flows through a distribution network. In addition, statistical or engineering analyses frequently boil down to the solution of a set of simultaneous equations for the characteristics of a curve which best fits the data.

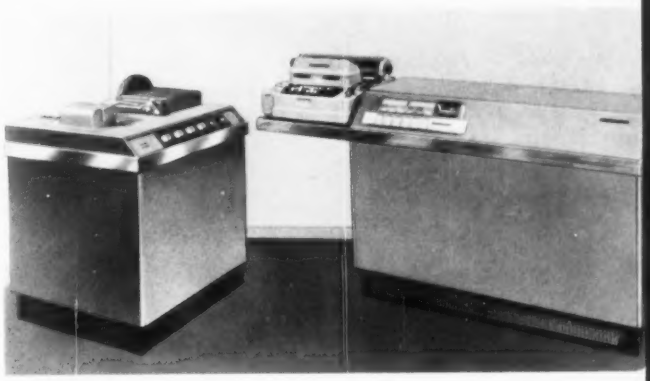
TABLE 1 — APPROXIMATE COST OF BASIC COMPUTING SYSTEMS

System	Cost
BIZMAC	$4,200,000
RAYDAC	$3,000,000
NORC	$2,500,000
IBM 709 IBM 705 IBM 704 IBM 702 IBM 701	$1-3,000,000
UNIVAC SCIENTIFIC 1102 UNIVAC II UNIVAC SCIENTIFIC 1103, 1103A UNIVAC I	$1-1,500,000
DATAMATIC 1000	$985,000
IBM 7070	$750,000
IBM 650 RAMAC TAPES	$500,000
UNIVAC FILE	$400,000
ELECOM 125, 125FP	$350,000
IBM 650	$206,000
BURROUGHS 205	$135,000
ALWAC III-E	$100,000
UNIVAC 120	$97,500
RECOMP II	$86,000
UNIVAC 60	$75,000
IBM 610	$55,000
BENDIX G-15D	$49,500
LGP-30	$49,500
BURROUGHS E-101	$40,000

Solution to Differential Equations

Many physical relationships can be mathematically expressed as differential equations. One outstanding example of this is the hydrologic equation relating inflow, outflow, and storage of a reservoir system. Other examples that come to mind are: vibrating systems; chemical reactions and processes; the drawdown characteristics of a pumped well; and relationships among acceleration, velocity, and displacement of a moving body. With a digital computer the solutions to these, and most other differential equations can be obtained, to any desired degree of accuracy, by numerical approximations.

Many problems of a less rigorous mathematical nature but with highly complicated logical structure have been programmed for computer solution. Typical is the design of highway cross sections, grade lines, and the computation of quantities of cut and fill. A computer also can type out a bar list, with reinforcing bars ordered by size and length. The bar list is entered in any order, just as it is taken from plans. These operations generally



Royal McBee Precision LGP-30 computer with auxiliary photoelectric tape reader and high speed tape punch

Lowest cost Burroughs E-101 pinboard programmed computer has optional punched card input-output unit.

are termed data-processing operations and are somewhat similar to many nonengineering operations, such as the computation of payrolls.

Mathematical Simulation

The simulation of physical systems or processes is a new technique available to the consulting engineer. With computer aid, mathematical models can be built and exhaustively analyzed. Variables may be altered and numerous trial runs attempted to find optimum relationships. The money and time used in the construction of physical pilot models can be reduced materially with the aid of this mathematical simulation. Entire water and sewage treatment plants, traffic flow patterns, and manufacturing operations have been simulated on small scale digital computers.

At present, the highest degree of complexity probably belongs to a class of problems with which few engineers are familiar. Game theory, decision theory, linear and dynamic programming, and operations research all deal with highly complex systems or environments. Optimum equipment usage, inventory control, market analysis, and maximum probability of success in contract bidding are problems typical of those attacked by these somewhat sophisticated techniques. Because of the great mass of computations inherent in this type of problem, these techniques were virtually unused before the advent of digital computers.

IBM 610, shown with complete input-output accessories, is easy to learn to use, features many built in checks.

Limitations of the Digital Computer

Three types of problems are not economically suited for solution with a digital computer:

"One-shot" problems. Programming (instruction writing), which is expensive, must be amortized over the course of several runs, unless the single problem is very long or its solution very valuable and could not be attained by manual methods.

Problems with little internal iteration. If a problem does not have portions that can be repeated, with necessary modification, a number of times, the programming is lengthy and difficult and the problem run becomes very costly.

Small Problems. Any computing system has an economic minimum problem size. Below this it is more practical to use desk calculators. Also certain small problems require a relatively large amount of time in preparation, input, and output, as compared to computer time.

Because of the lower economic minimum problem size for small computers, they are capable of handling an extremely wide range of problems. Also, a small computer, with but few exceptions, eventually can finish any problem that can be completed on any larger computer.

The scope of all sizes of computers recently has been expanded by application of automatic programming methods which direct the computer to write many of its own instructions, or to use more efficiently those the programmer has written. These automatic programming techniques have greatly broadened the economic problem size by reducing programming costs. An example of the instruction necessary to solve for one of the roots of a quadratic equation using automatic programming techniques might look like:

$$\text{Root} = \frac{-\text{B} + \text{SQRT}\,[\text{B} \times \text{B} - (4.0 \times \text{A} \times \text{C})]}{2.0 \times \text{A}}$$

The computer then proceeds to translate this chain of mnemonic symbols into a working program.

To illustrate the high cost of programming, the directors of one large computing system state that their program library has cost them approximately $4 per instruction, and there can be thousands of

Bendix G-15D computer offers as standard equipment a 200 characters-per-second photoelectric tape reader.

Magnetic tape storage units are available at extra cost. G-15D has wide application in the civil engineering field.

instructions in a single subroutine. Other installations report costs-per-instruction of between $1 and $10.

Computer Components

All general-purpose digital computing systems are composed of at least five elements: input (read-in), storage or memory, arithmetic and logic unit, control, and output.

Input. Small computers differ more significantly from large computing systems in input and output facilities than in any other element. Often, a small computer is input-output bound – which means that the over-all problem speed ultimately is governed by the speed of the input-output equipment.

Input is either through a keyboard, an accounting machine, a modified electric typewriter, a punched paper tape reader, or combinations of these. In a few instances a punched card system is used as a basic read-in device. For most of the other systems, punched cards can be handled by auxiliary devices available at extra cost (or custom built) such as card to paper tape converters.

A commonly used method of reading data and instructions into the computer is by a modified electric typewriter which punches a paper tape, which in turn is read into the computer by a paper tape reader.

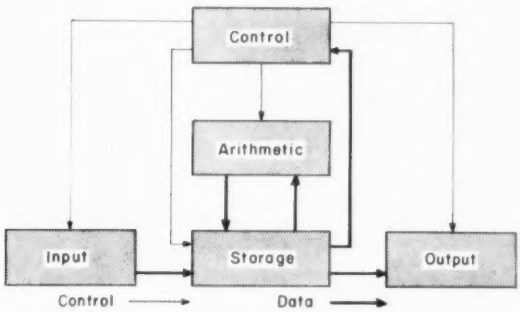
Only a very few of the small computers offer magnetic tape input as an extra cost item. The Bendix G-15D, which can accommodate up to four tape units, is one that does. Magnetic tape, because of its great speed, is much to be desired where large amounts of data are to be processed. But any system offering magnetic tape input-output must be regarded as a bit more than a small computer.

Input speeds on small computers vary from manual entry to 400 characters per second for a photoelectric punched paper tape reader, and 430 characters per second for the Bendix magnetic tape reader.

Storage. A few of the smaller computers (the UNIVAC 60 and 120) use electronic tubes as storage devices, but this seriously limits capacity. Storage, or memory, is primarily in the form of a magnetic drum or disc although magnetic cores currently are being used for the IBM 608, an electronic accounting machine which will be in production within the next year, and Bell Telephone Laboratories' LEPRECHAUN, a laboratory model.

Internal storage capacity varies from the 60 or 120 decimal digits of the UNIVACs to 4096 multidigit words in the North American RECOMP II and the Royal Precision LGP-30.

Internal access times – a basic criteria for machine speed – vary from about 0.50 milliseconds in the high-access-speed loops of the fastest small computer to approximately 40 milliseconds. (The



The five basic components above are common to all digital computing systems for general-purpose use.

Bell LEPRECHAUN has a random access time of 8 milliseconds.)

External storage is limited in capacity only by bulk and ease of access, and consists of printed matter, punched paper tape, punched cards, magnetic tape, or typed copy.

Arithmetic Unit. The basic mathematical and logical operations are carried out in the arithmetic unit. There are several types of arithmetic and logical operations that most arithmetic units can perform: add, subtract, multiply, divide, compare, and a series of "bookkeeping" operations.

Some small computers are a great deal more flexible than others. One of the marks of flexibility is the availability of built-in "floating point" operations which keep track of the shifting decimal points. However, most computers that do not have these operations built in can be programmed for floating point by the use of subroutines.

Control. The control unit is the most obscure portion of a computing system, and one that an operator seldom need consider. This unit contains the circuitry that makes the computer execute the operations called for by the operator or programmer.

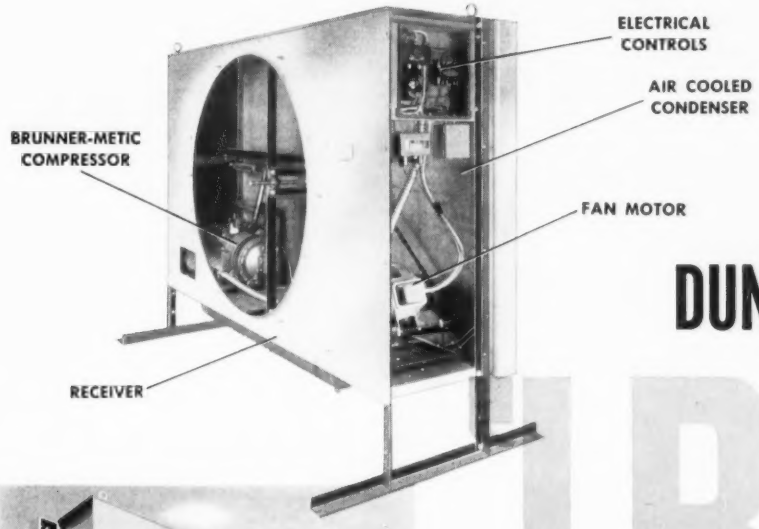
Two types of instruction entry and storage schemes, internal and external, are used. External program entry and storage is by means of a plugboard or pinboard (or in one computer, entry from

TABLE 2 — COMPARATIVE FEATURES OF FIVE SMALL COMPUTERS

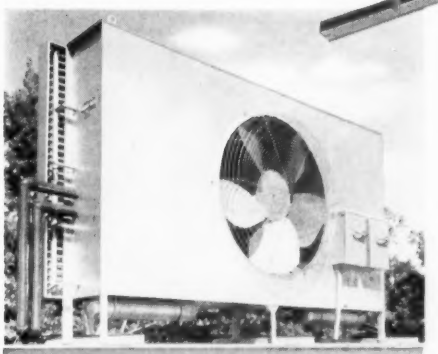
Manufacturer	***Bendix***	***Burroughs***	***IBM***	***Royal McBee***	***North American***
Model	***G-15D***	***E-101***	***610***	***LGP-30***	***RECOMP II***
Space requirements	8 ft x 8 ft	12 ft x 12 ft	10 ft x 10 ft	9 ft x 9 ft	8 ft x 8 ft
Power consumption	3.0 kw	2.5 kw	1.65 kw	1.5 kw	0.6 kw
Air conditioning needed	desirable	desirable	desirable	desirable	none
Input equipment	typewriter paper tape punched cards* magnetic tape*	keyboard paper tape punched cards*	keyboard paper tape	typewriter paper tape	keyboard paper tape
Storage—Type	drum	drum	drum	drum	disc
Word size	30 binary	12 decimal & ±	15 decimal & ±	32 binary	41 binary
Number—bulk	2160	100 or 220*	84	4080	4080
Number—high speed	16	—	—	16	16
Number of commands	1300	29	29	16	48
Floating point hardware	no	no	yes	no	yes
Alpha-numeric hardware	yes*	no	no	yes	yes
Instruction Entry and storage	drum storage as data	pinboard console paper tape	keyboard plugboard paper tape	drum storage as data	disc storage as data
Operational speed	milliseconds	milliseconds	milliseconds	milliseconds	milliseconds
Bulk storage access	14.5 average	not available	56	17 maximum	8.7 average
High speed storage access	0.54 average	not available	56	2 minimum	0.91 average
Addition:					
Exclusive of access	0.54		56	0.26	0.52
Including access		50			
Multiplication:					
Exclusive of access	16.7		1360	17	10.4
Including access		250			
Output equipment	typewriter paper tape tabulator* punched cards* magnetic tape*	tabulator paper tape punched cards*	typewriter paper tape C-R tube	typewriter paper tape C-R tube	typewriter paper tape visual read-out
Outstanding features	Very active user's organization, especially in the civil engineering field	Pinboards easier to change than wired plugboard	Extremely easy to learn to use Many built in checks	Very easy-to-learn order list High speed paper tape reader optionally available	Fully transistorized, weighs 200 lbs excluding input-output, portable, ruggedized
Purchase price	$49,500	$40,000	$55,000	$49,500	$86,000
Monthly rental	$1485	$1000	$1150	$1100	not available

*Available at extra cost

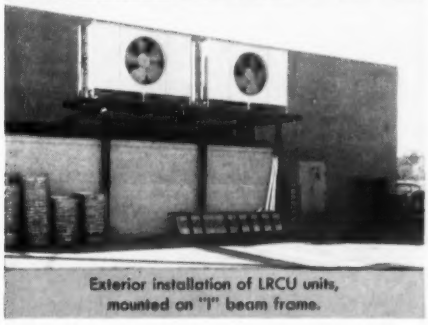
NEW CONCEPT IN BUILT-UP AIR CONDITIONING SYSTEMS



DUNHAM-BUSH 'LRCU' UNITS

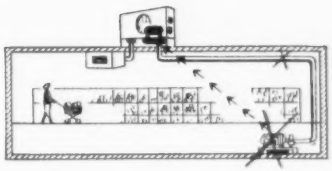


Typical rooftop installation of LRCU unit.



Exterior installation of LRCU units, mounted on "I" beam frame.

By incorporating the compressor and receiver in the same casing as the remote air cooled condenser there are substantial savings in space and installation costs on built-up air conditioning systems.



Eliminate expensive installation costs . . . plumbing . . . wiring . . . with a Dunham-Bush 'LRCU' Large Remote Condensing Unit. Here's a complete package consisting of a remote air cooled condenser, semi-hermetic compressor, magnetic starter, receiver, controls and refrigeration accessories all piped and wired.

Install on the roof (or other convenient location) and run the necessary refrigerant lines to the lowside equipment. Make electrical connections and the system is ready for operation.

Available in 5 models from 10 to 30 tons. Two-step starting makes units readily adaptable for capacity control. Two compressors furnished on 20, 25, and 30 HP units.

Write today for complete information.

Dunham-Bush, Inc.

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DUNHAM-BUSH

AIR CONDITIONING • REFRIGERATION • HEATING • HEAT TRANSFER

So SIMPLE that "Specials" are Likely to be Standard!

A sleeve, raised and lowered within a non-magnetic tube, attracts or releases an Alnico magnet attached to a mercury switch. Basically, this is Magnetrol

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The World's Most Dependable

LIQUID LEVEL CONTROL

Because of the utter simplicity of Magnetrol's magnetic operating principle, standard models can be easily adapted to meet any special requirements for pressure, temperature or corrosive liquids . . . and usually at little extra cost. This Magnetrol versatility has solved all kinds of tough level control problems . . . and given our engineers wide application experience that can be invaluable to you.

Magnetrol is so simple that failure is all but impossible! Using only permanent, unfailing magnetic force for its operation, there's nothing to wear out . . . no diaphragms or bellows to stiffen and rupture . . . no electrodes to short or corrode . . . no packing to bind or leak. Magnetrol is practically maintenance-free! Magnetrol units are available for controlling level changes from .0025-in. to 150-ft. . . . with multi-stage switching when desired. Send coupon for full details.

MAGNETROL, Inc.

Send Coupon For Full Details

MAGNETROL, Inc., 2105 S. Marshall Blvd., Chicago 23, Illinois

Please send me catalog data and full information on Magnetrol Liquid Level Controls. 6

Name _____

Company _____

Address _____

City _____ Zone _____ State _____

a keyboard), while the instructions of an internally stored program are entered as data, into the memory, and the computer is directed to refer to these instructions in some particular order. Internally stored programs have one basic advantage – they appear as data and consequently can be modified by calculation.

Output. Output and input units are sometimes ganged with one piece of equipment used for both functions. In addition to the input units already mentioned, there are digital read-out devices analogous to the dials on a desk calculator, cathode ray tube presentations, and graph plotters.

Output speeds vary from 10 to 430 characters per second, but because of electro-mechanical requirements (like punching holes in a paper tape) are generally less than automatic input speeds.

A comparison of five computers that include, in the aggregate, the entire range of features currently offered in the small computer field is provided in Table 2. All are in the size range that should be of interest to consulting firms. Cost and rental data also are included to indicate the practicality for individual circumstances.

Service Bureaus

Many consulting firms seem to prefer to rent the time of service bureau computers, auxiliary equipment, and personnel. This might appear to be a happy solution because everybody seems to profit. However, use of service bureaus is expensive and can be unsatisfactory on several counts.

Unless a submitted problem can be reduced to an ordinary mathematical problem, service bureau personnel frequently will have little or no knowledge of that problem and its best possible solution method. Nonproductive time must be spent reviewing the problem before the programming can be started. If a computer were available to a user right in his own office, under the direction of his own personnel, much of this nonproductive time could be eliminated.

The fact that a service bureau may not be located nearby can be a deterrent in some instances, although many ingenious data transmission systems are being devised.

A more serious deterrent is the matter of business security. There is some information that a company cannot release to other than its own personnel. Even though most service bureaus have means for handling proprietory material, there is always the specter of this type of information being disclosed to outside personnel.

Lastly, many firms go to a service bureau because they feel they cannot afford the full-time services of a computer – then spend more each month than their rental bill would have been. ▲▲

EVERYWHERE in Sewage Treatment Plants

Evansville, Ind., Sewage Treatment Plant has two Climax V-85 and three Climax V-80 eight cylinder engines driving the sewage pumps.

CLIMAX ENGINES POWER the PUMPS

• Driving the Evansville, Indiana, sewage treatment plant's Worthington vertical sewage pumps through right angle gears at 720 rpm, 70 lb. BMEP, are five Climax eight-cylinder, 60-degree V-type sewage-natural gas engines. Two are 2474 cubic inch Climax V-85 model, 7 1/8-in. bore x 7-in. stroke; and three are 2155 cubic inch Climax V-80 model, 7-in. bore x 7-in. stroke. Equipment includes dual ignition, air starting, Viking pump, Sarco blender, oil bath air cleaner, Honan Crane oil purifier, Synchro-Start ALS control and automatic fuel switchover.

The unusual compactness of Climax V-8 design means more power packed into less space. Rugged too, for durability with dependability in continuous duty sewage plant service.

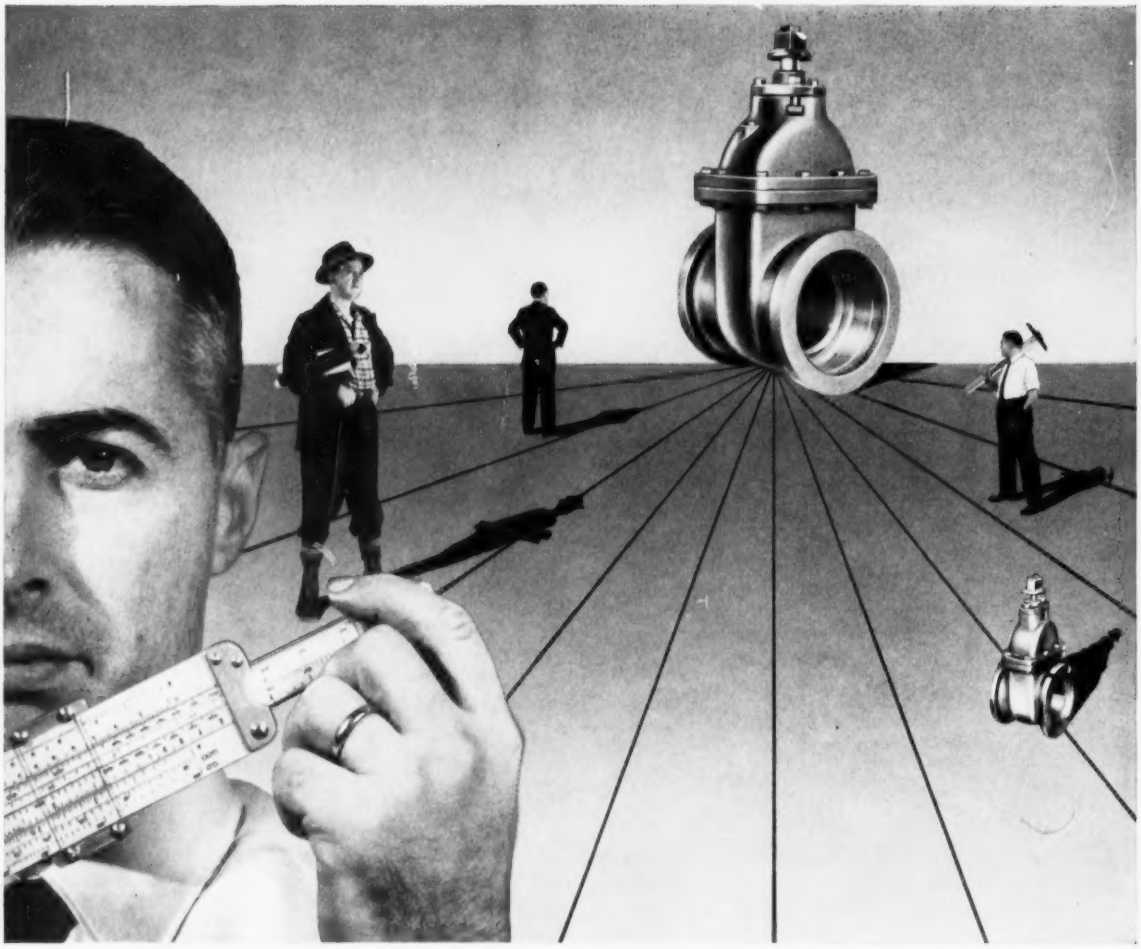
Fuel economy is built-in. All the Climax plus-value operational features are described in Bulletin SA-584—send for it.

CLIMAX ENGINE MANUFACTURING CO.

FACTORY—CLINTON, IOWA

DIVISION OF WAUKESHA MOTOR COMPANY

CL-102



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Sound design and quality workmanship to guarantee ease of operation, watertight closure, years of trouble-free performance

The perfect gate valve, according to engineers and water superintendents, must combine simplicity and soundness of design, tightness of closure, ease of operation and quality of workmanship.

All Ludlow gate valves and all Rensselaer gate valves are designed to meet these requirements, as well as A.W.W.A. specifications.

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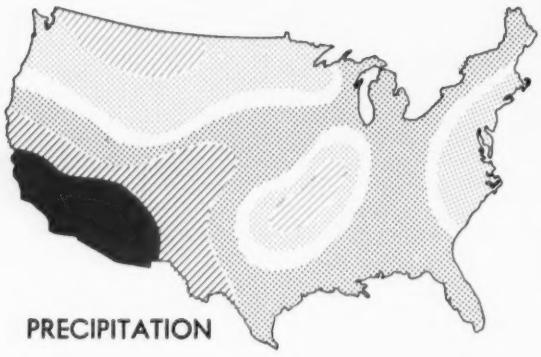
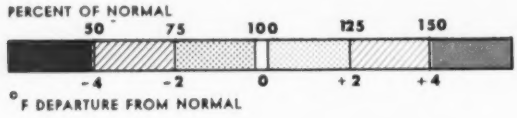
KRICK WEATHER OUTLOOK

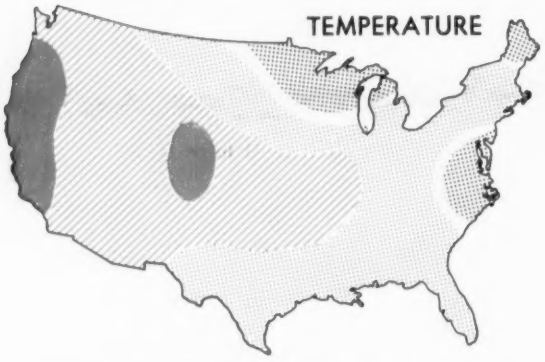
FEBRUARY 1959

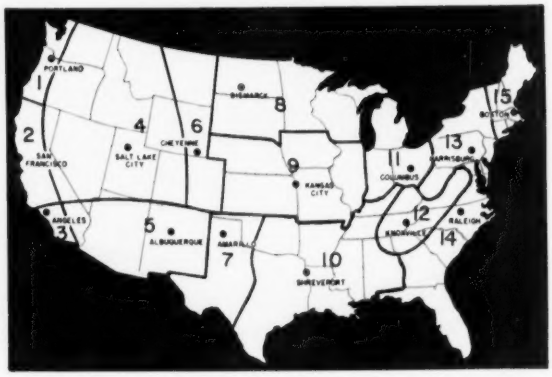
Prepared Exclusively for CONSULTING ENGINEER



PRECIPITATION







CONSTRUCTION DAY FORECAST LOCATIONS

CONSTRUCTION DAY CRITERIA

To be considered a construction day on these charts, the day's maximum temperature must be more than 38 degrees. There must be less than six inches of snow on the ground. There must be less than six hours of active precipitation during the period between the hours of 7 a.m. and 5 p.m. There also cannot have been more than one inch of rainfall on the preceding day.

FEBRUARY HIGHLIGHTS

During February, relatively mild temperatures are in prospect over much of the United States. The area extending north and eastward from the Missouri River, and eastward from the Mississippi Valley is expected to have near normal to slightly above normal average temperatures. Only the area east of the Appalachians in the mid-coastal states can expect temperatures to range slightly cooler than the historical average. Areas south and west of the Mississippi and Missouri Rivers are expected to be warmer than normal with the country's warmest readings in relation to normal expected to occur along the east face of the Rockies, and in California and western Oregon. In conjunction with the mild temperatures, February can be expected to be dry. The southwestern states are expected to be extremely dry, receiving only about one-half of the normal rainfall. Although the west is to be arid and warm, frequent intervals of storminess and cold weather are expected, with below zero readings in many sectors. Three areas of predominant above-normal moisture are expected during the month. The east coastal states, except northern New England and Florida, are expected to have slightly more than normal moisture. Northern states from the Great Lakes westward, should have above normal precipitation with heaviest amounts likely along the Canadian border from Montana west. Look for wetter than normal weather in the Ozarks, Boston, and Ouachita mountains. In general, the mild, dry weather should aid construction in most of the country; prospects are much more favorable than last year.

TEAR OUT ALONG PERFORATION.

These forecasts are prepared by Irving P. Krick Associates, Inc., the world's oldest and largest weather engineering firm. The forecasts are based on methods developed by this group at California Institute of Technology prior to World War II. After the War, the methods were adapted to high speed electronic computing machines to shorten the time required to solve the complex problems of the atmosphere. Ultra-long range forecasts, up to a year or more in advance, are now available. Information on other Krick weather services is available by writing to the home office of the firm at 460 South Broadway, Denver, Colorado.

CONSTRUCTION DAYS

FEBRUARY 1959 ESTIMATES															
LOCATIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
HIGHEST	26	27	28	23	29	23	29	10	26	28	22	26	24	28	15
LOWEST	10	22	21	7	21	8	20	0	9	18	5	15	10	19	8
AVERAGE	20	25	25	18	26	14	25	3	17	24	14	22	15	24	11
ESTIMATE	19	26	27	18	27	20	23	5	18	25	17	23	15	22	12

These estimated construction days for key cities in the United States should be interpreted as an average of estimated conditions over the forecast area. To obtain the best results, the forecast number of construction days should be compared with the temperature and precipitation anomaly maps and the timing estimates to determine the probable number of construction days in your locality. The forecast construction days are based on average construction day requirements as defined under "Construction Day Criteria," and should be adjusted for individual operations.

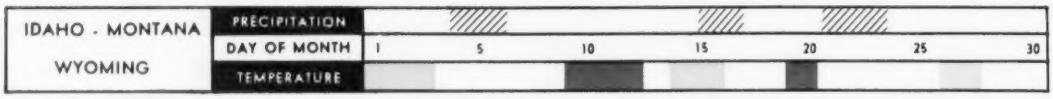
MARCH AVERAGE AND RANGE*															
LOCATIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
HIGHEST	31	30	31	30	31	31	31	22	27	31	29	30	27	31	28
LOWEST	20	26	26	14	27	14	25	1	16	23	14	22	17	24	12
AVERAGE	25	28	29	25	30	22	29	9	22	28	21	27	22	28	19

APRIL AVERAGE AND RANGE*															
LOCATIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
HIGHEST	30	30	30	30	30	29	31	29	29	30	28	30	29	29	27
LOWEST	25	25	27	25	29	19	24	12	23	26	22	26	20	26	21
AVERAGE	27	29	29	28	30	24	28	24	26	27	25	28	25	27	25

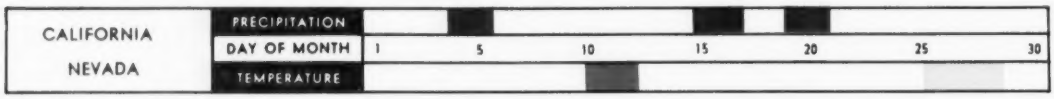
*Historical Average, Not a Forecast

FEBRUARY 1959 TIMING OF SIG

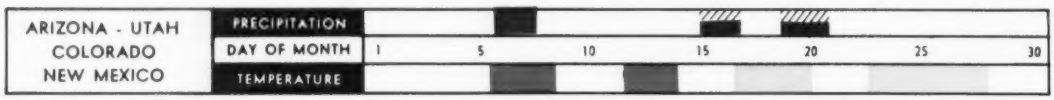
Precipitation should range near to slightly above normal in Oregon with Washington likely to be slightly wetter. The stormy interval around the 15th is expected to be an important one. For the month as a whole warmer than normal temperatures are expected throughout the area.



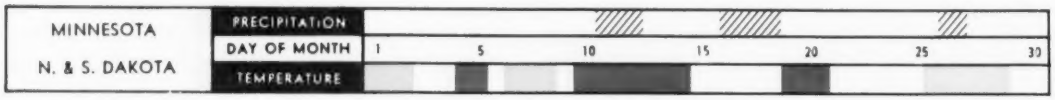
Most of this region is expected to receive above normal precipitation during February, with the northern sections receiving the heaviest amounts. The cold outbreak that is indicated for around the 20th should settle mostly in Wyoming and Montana.



Dry, warm conditions are expected to prevail throughout this area. Although temperatures are expected to be warm in relation to normal, a cold interval following the 10th of the month is likely to move freezing temperatures into most of California.

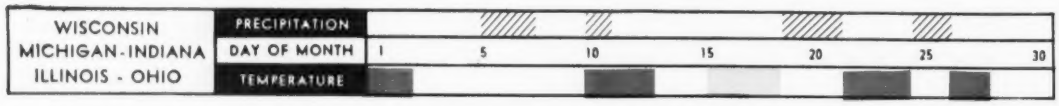


Mild and dry summarizes the weather outlook for this region during the month of February. The cold outbreak indicated for around the 13th is expected to be most important in Utah. The last half of the month should be very mild.



Precipitation is expected to be slightly above normal in the northern portions of the region to slightly below normal in the southern areas. The coldest weather should occur during the interval indicated for several days around the 11th of the month.

Heaviest amounts of moisture during February are expected in Missouri while the other states in this area should have near to slightly below normal amounts. It will be well to look for the most prolonged cold weather on several days as indicated around the 10th of the month.

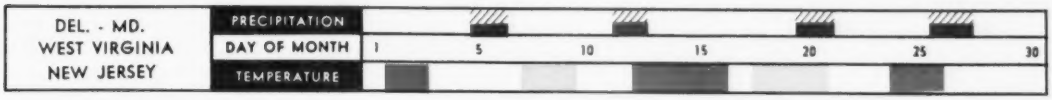


Frequent surges of cold, arctic air are in prospect for this region. Low temperatures should drop down into the teens during the indicated cold outbreaks. The storm shown at around the 26th of the month is expected to be most important in the southeastern half of the area.

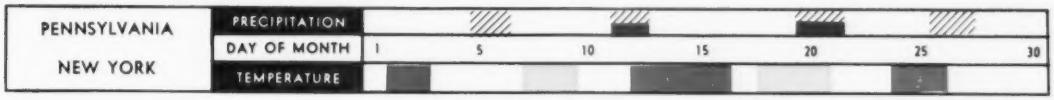
SIGNIFICANT WEATHER EVENTS

RAIN
SNOW
WARM
COLD

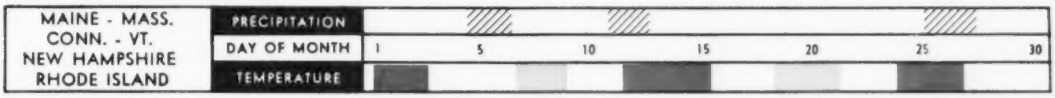
The timing bars below are intended to indicate periods of important general storminess and important departure from temperature normals in areas indicated. They are highly accurate over the area indicated, but are too general to pinpoint small local storminess or showers. Allow one day on either side of indicated storm or extreme temperature periods for general planning. Combination rain or snow shading indicates either one or both.



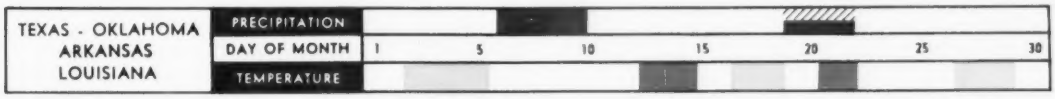
These states are expected to be damp and cool during the month of February. Temperatures in the teens are likely during the indicated cold outbreaks. Look for mild, rising temperatures to occur on several days around the 17th.



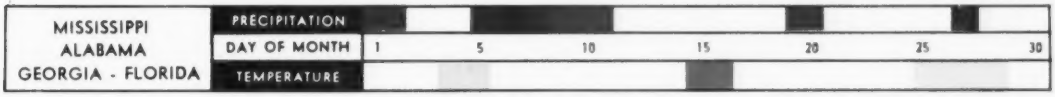
Near normal temperatures are expected throughout this region. The southeastern areas should receive the heaviest precipitation totals during the intervals of storminess. Cold outbreaks during the month should drop low temperatures into the teens.



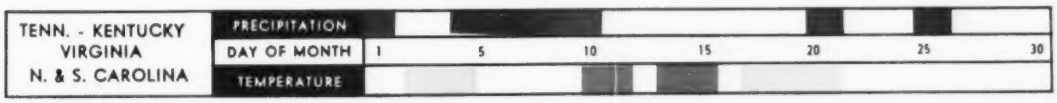
Slightly below normal moisture can be expected in this area. The most prolonged interval of cold weather is expected around mid-month. However, the average temperatures for the month as a whole are expected to be near normal throughout the region.



Stormy interval following the 5th should be important in northern Texas and central Oklahoma. Cold interval near the 19th should bring coldest readings into northern Oklahoma. Generally, temperatures during the month are expected to be above the seasonal normal.



As a whole, mild and dry is the outlook for February in this region. Storminess early in the month is not expected to reach down into Florida. A prolonged interval of intermittent showers is expected during the period starting around the 5th of the month.



Coastal areas are expected to have above normal amounts of moisture while areas westward should be slightly drier. The prolonged stormy interval starting around the 3rd of the month is expected to bring recurring cloudy and stormy patterns into the southern sections.

This Armco Corrugated Metal Pipe, after assembly on the stream bank, is now ready for lifting with a crane and swinging into position.

Consulting Engineer: R. Kenneth Weeks, Engineers; Norfolk, Va.
Contractor: J. R. Houska Company, Norfolk, Va.

View of skewed end of the same Armco MULTI-PLATE Pipe, installed near Speight's Run Dam, that saved money for Portsmouth, Va. Pipe has been coated with asphalt.

"Armco MULTI-PLATE Pipe helped City of Portsmouth save $5,000"

So said Mr. X. D. Murden, Superintendent of the Water Department, Portsmouth, Virginia.

He was referring to an installation of Armco MULTI-PLATE® Pipe, 13 feet in diameter and 70 feet long, used in place of a conventional bridge in connection with a dam built to supply water for Portsmouth.

Original plans called for a steel beam bridge with concrete deck and abutments supported on timber piling. But after test piles were driven to unexpected depths, it was realized cost would be much more than planned. So the MULTI-PLATE Pipe was proposed by the engineers to effect considerable savings.

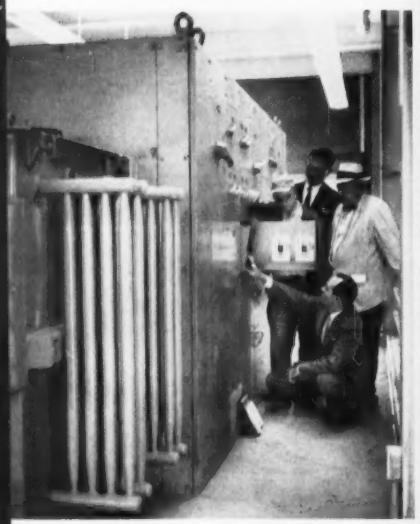
Armco Corrugated Metal Drainage Structures are being installed under expressways all over the country. They have a record of proved durability in both highway and industrial installations. Write us for factual data and prices. Armco Drainage & Metal Products, Inc., 6028 Curtis Street, Middletown, Ohio.

ARMCO DRAINAGE & METAL PRODUCTS

Subsidiary of ARMCO STEEL CORPORATION

OTHER SUBSIDIARIES AND DIVISIONS: Armco Division • Sheffield Division • The National Supply Company
The Armco International Corporation • Union Wire Rope Corporation • Southwest Steel Products

View from pump floor in Oswego, New York, pumping station showing one of main pumps being driven by Westinghouse 300-hp vertical synchronous motor above.



Robert B. Stannard, Resident Engineer for Nussbaumer, Clarke and Velzy, Consulting Engineers; Karr Parker, Jr., Buffalo Electric Co.; Kenneth D. Jensen, Superintendent, Department of Water, Oswego; and M. B. Trimble, Westinghouse Construction Sales Engineer, discuss "tilt-out, lock-out" feature of the control center. Westinghouse double-ended control power center has 300-kva Inerteen® transformer at each end.

Oswego water pumping station Powers-Up to attract new industries

The modernization and expansion program of the Department of Water, Oswego, N. Y., provides an interesting example of building today for tomorrow's needs. While planning for today, Oswego's Water Board recognized that a good water supply is an indispensable commodity in attracting new industry to the area. By Powering-Up electrically, their new pumping station has electrical capacity five times present demand to allow for future growth.

Present demands for water are approximately 10 million gallons per day. Installed pumping capacity is capable of providing more than 20 million gallons per day. In addition, provision has been made to increase capacity to 35 million gallons per day when required by future demands.

The new pumping station is supplied with lake water from an intake tunnel which extends through solid rock for a distance of 6250 feet into Lake Ontario. This tunnel intake averages eight feet in diameter and is capable of conveying 128 million gallons of water per day.

Electrical power for the station is available from two separate sources—one direct from the Oswego Steam Station and the other from the Niagara-Mohawk Varick Station. The complete electric distribution system, as furnished by Westinghouse, provides for all anticipated future expansion of the pumping station.

Powering-Up electrically for future growth can offer important advantages to you. For further information, call the Westinghouse electrical engineer nearest you, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-94119

Owner: Department of Water, Oswego, N. Y.
Consulting Engineers:
Nussbaumer, Clarke and Velzy
General Contractor: McElwee-Courbis Const. Co.
Electrical Subcontractor: Snyder and Mackin, Inc.
Westinghouse Distributor: Buffalo Electric Co., Inc.

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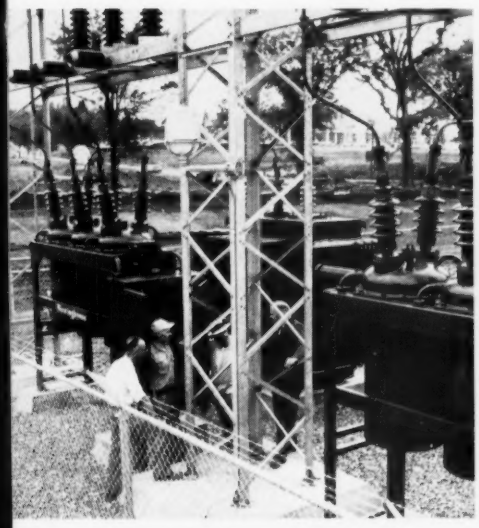

Leo J. Landrigan, Superintendent, Oswego Pumping Station; Richard C. Mansfield, Foreman for Snyder and Mackin, Electrical Contractors; Kenneth D. Jensen; and Charles T. Hansen, Westinghouse Sales Engineer, at outdoor substation which serves new Oswego pumping facility. Two Westinghouse 2000-kva power transformers and two Westinghouse 34.5-kv oil circuit breakers are included in this substation.

Main floor view in pumping station shows four Westinghouse vertical synchronous pump motors with the glass enclosed control room in background. The mezzanine floor above is occupied by Westinghouse 2300-v, heavy-duty, metal-clad switchgear, using Type DH air circuit breakers.

Another view of main floor shows reverse side of control room and, on the mezzanine, Westinghouse double-ended control power center. Floor openings in foreground, not shown, have been provided for the installation of four additional raw water pumping units when filter plant is added.

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Field Notes

MARJORIE ODEN

Eastern Editor

THE PENNSYLVANIA Department of Highways plans to cut its use of consulting engineers by 40 percent during the next four to eight years, according to Henry D. Harral, who served until January as Chief Deputy Secretary of the department.

Approximately 40 consulting firms now do an estimated 90 percent of Pennsylvania's highway design work and collect fees estimated at $1 million per month. With the highway budget expected to double within the next 10 years, the new policy would mean quite a financial loss to consultants.

Safety Foundation Study

The changes are based on findings of the Automotive Safety Foundation, which made a thorough study of Pennsylvania highway laws and policies at the request of former Governor George M. Leader and the State's Senate and House. Many of the Safety Foundation recommendations were scheduled to be presented as legislation in late January or early February, but as an administrative matter, the use of consultants is not mentioned in proposed legislation.

Harral explained that it is the opinion of state officials that the highway department design staff should be strengthened. This also was the finding of the Safety Foundation, according to two brochures it published—*Pennsylvania Highways* and *State Highway Policies and Practices in Pennsylvania.*

Some time ago, the U. S. Chamber of Commerce published the *Businessmen's Guide to the Road Program.* This booklet included a statement that "Of course, there is a place for the consulting engineer in this [highway design] work but remember that, for the long pull, the public interest will be best and most economically served as the tax dollar is invested in your own public engineering organizations." This statement, to which the Consulting Engineers Council took exception, was a quotation from Pyke Johnson, former president of the Automotive Safety Foundation.

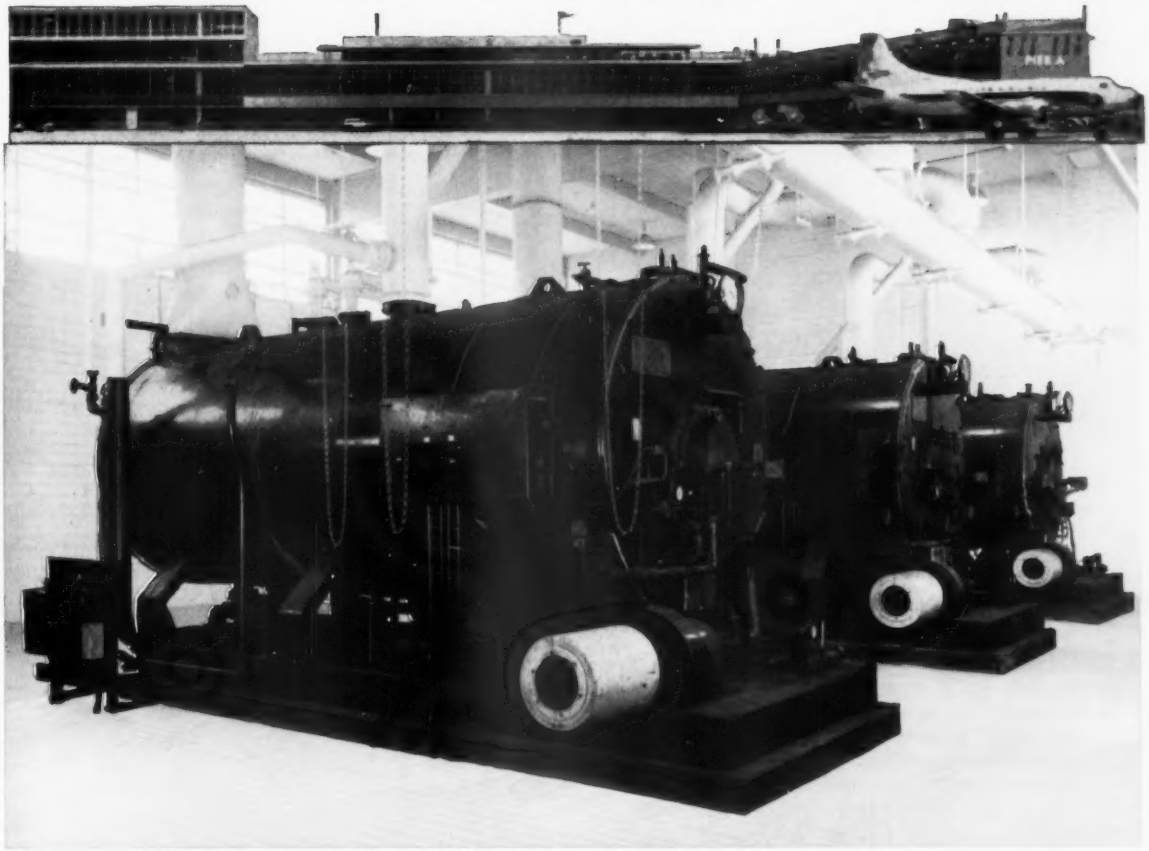
According to Safety Foundation literature, "ASF pioneered in the statewide highway needs studies . . . has completed or has surveys under way in 19 states. Purpose is to insure a maximum return on each road dollar invested."

"Contract Engineers"

The Safety Foundation recommendations to Pennsylvania on the future organization and policies of the highway department contained a lengthy discussion of "contract engineers." This designation of consulting engineers is that of the Safety Foundation, not the Pennsylvania highway department.

In its detailed appraisal, the Safety Foundation said, "The extent to which contract engineering services should aid a highway department is a moot question. Some departments use contract engineers only for unusual designs such as structures over large waterways. Others have found it necessary to

HEAT FOR A MAJOR AIRPORT



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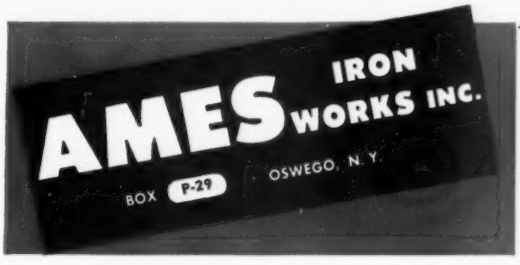

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Nugent Sight Flow Indicators have large, double windows to aid visibility. Standard windows are heavy plate glass for ambient temperatures, however Pyrex or Lucite windows are available. A spring-compensated indicator gate swings close to the inside surface of the window, moving in proportion to the flow, and is visible even when the liquid is dark or discolored.

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use them only for unusual peak loads, such as the work volume occasioned by the recently stepped-up interstate program.

"Traditionally, highway departments have been staffed to plan, locate, and develop designs for their normal work loads. This was one of the requirements of early Federal-aid acts and generally has been maintained by the states. In the early days of the present [Pennsylvania] administration the work load was up and engineering manpower was down. Under these circumstances, the use of contract engineers was the only alternative.

" . . . The department should begin now to assume a greater portion of the design within the organization. The shift could begin by surveying all locations and preparing construction plans for all widening, resurfacing, and reconstruction. As the personnel situation is strengthened, the design of all rural roads and, progressively, principal state highways should be performed by the department. In the interim, employment of contract engineers will have to be continued. Ultimately their services may be retained only for the more unusual and complex work of large structures, interchanges, and urban freeways and for peak work loads."

Supervision and Standards

The policy recommendations also suggested that "Supervision of all contract engineering design should be the responsibility of the central office. A project design engineer should be assigned to each contract engineer's office. He should have authority for decisions within reasonable limits. Such project engineers also should advise district office designers."

And . . . "Designation of design standards should be the responsibility of the design bureau. For final designs, the bureau should: (a) designate the general treatment of all intersections as to traffic control such as signals, channelization, separation, and geomet-

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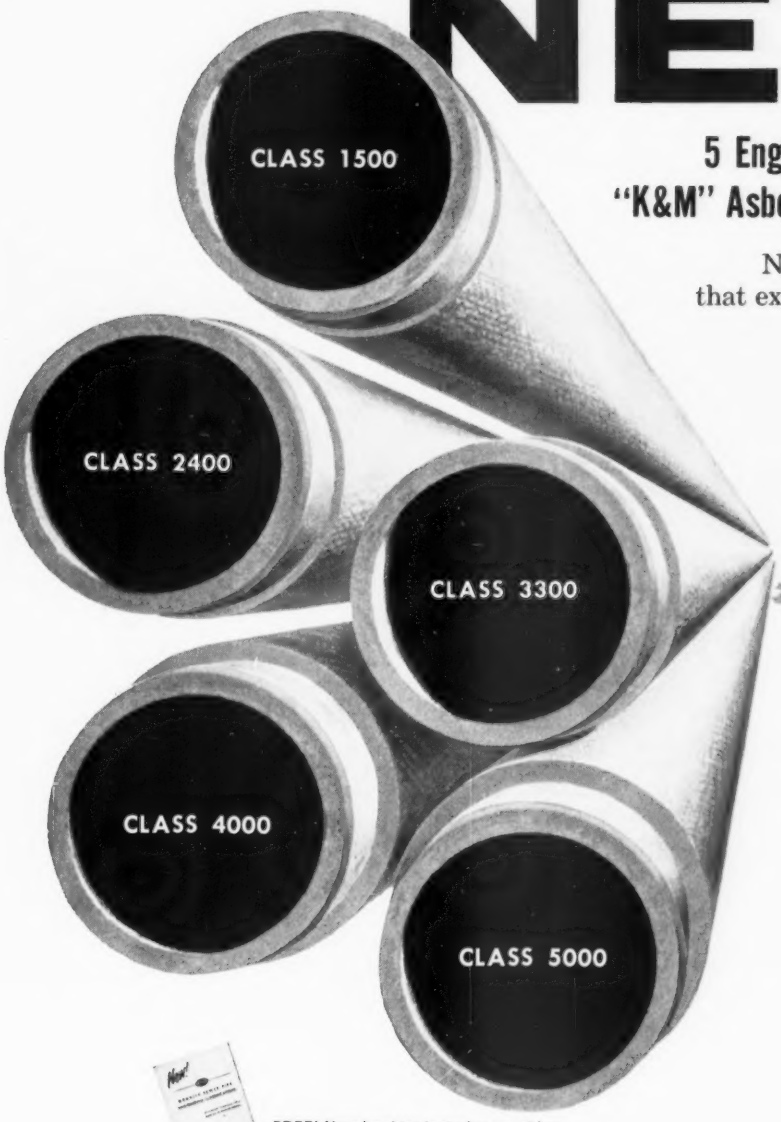

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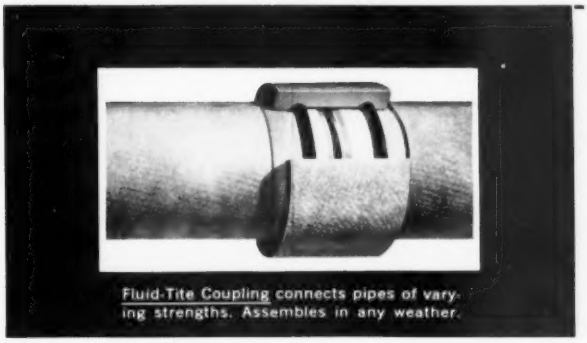

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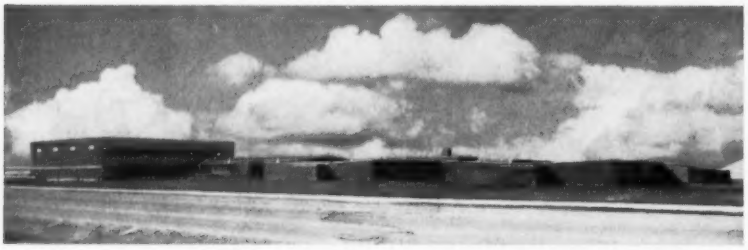

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ric type of interchange; (b) furnish typical roadway cross sections; (c) designate base and pavement type; and (d) determine the degree of control of access."

The second brochure – *Pennsylvania Highways* – published by the Safety Foundation was designed for more general readership . . .

"In Pennsylvania during recent years, because of the expanded postwar construction program, the work load of highway design was greatly increased. At the same time, the department's engineering staff was depleted. In these circumstances, much of the work was farmed out."

The brochure also pointed out that . . . "Some [highway] departments have not found it necessary to employ any [consultants]."

Design Ratios

Harral said that Safety Foundation and Pennsylvania highway department officials agreed that the present 90:10 ratio of design work was too heavily in favor of consulting engineers. However, he added that the Safety Foundation mentioned California as the example of a state having a good proportion for design work. The Foundation said California has 90 percent of the highway design done within the highway department and 10 percent done by consultants.

"We felt that was a little extreme," Harral said. "We feel that a 50:50 design ratio is more nearly in keeping with the average for most of the states."

In his recent report to the outgoing governor, Harral suggested that within two or three years a reassessment be made as to whether the reapportionment of design was working out. "We might find it best to stop at that point with only an additional 20-30 percent of the design being added to that currently done by the highway department."

The Pennsylvania highway department, at present, would have trouble going heavily into design

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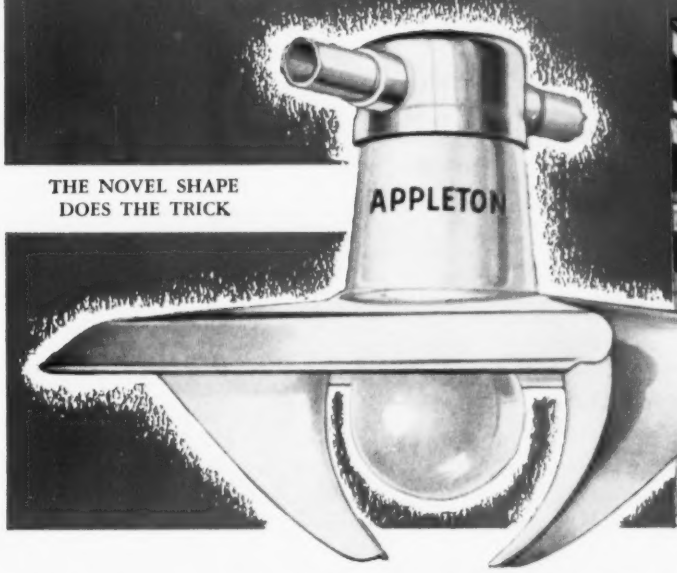

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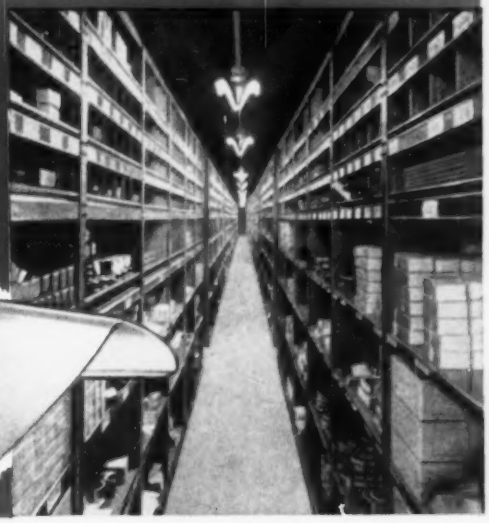

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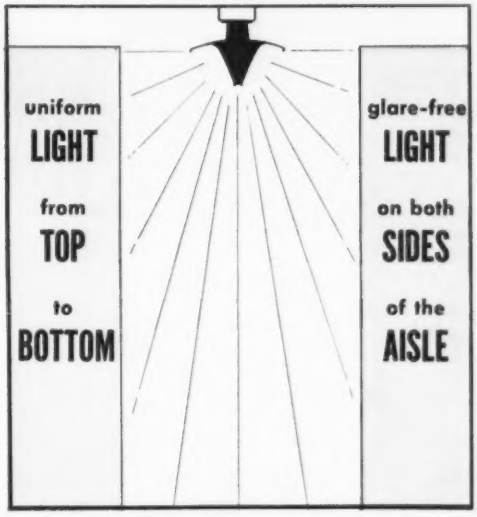

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work. As the Safety Foundation report pointed out, "Of the 543 department employees in engineer classifications, only 92 are graduate engineers. An additional 54 are registered professional engineers but are not graduates. The remaining 397, or 73 percent of the total, are neither engineering graduates nor registered.

"A nationwide study of state highway departments made by the Highway Research Board in 1956 showed that of all state highway employees classified as engineers, 44 percent were engineer graduates and an additional 17 percent were registered professional engineers but not graduates. At that time, Pennsylvania reported the lowest percentage of graduate engineers among all the states."

Harral said considerable progress already has been made toward upgrading the highway staff since May 1, when the Safety Foundation report was compiled. Approximately 80 graduate engineers have been hired, lowering the percentage of nongraduates and nonregistered engineers.

How Well Do Consultants Work?

Was the Pennsylvania highway department happy with the design it was getting from consultants? "We got some excellent and some poor design," Harral said. He blamed the "poor design" on the rapid increase in the need for consulting engineers, which allowed some men who were not technically qualified to get state work. Incidentally, he said the state has a long memory when it comes to awarding projects, and the consultants who have done "unimaginative or inadequate" design do not get future work. He added that his criticisms were of the few, not of the majority, of consulting engineers, and "I feel that most of Pennsylvania's highway design work has been basically good."

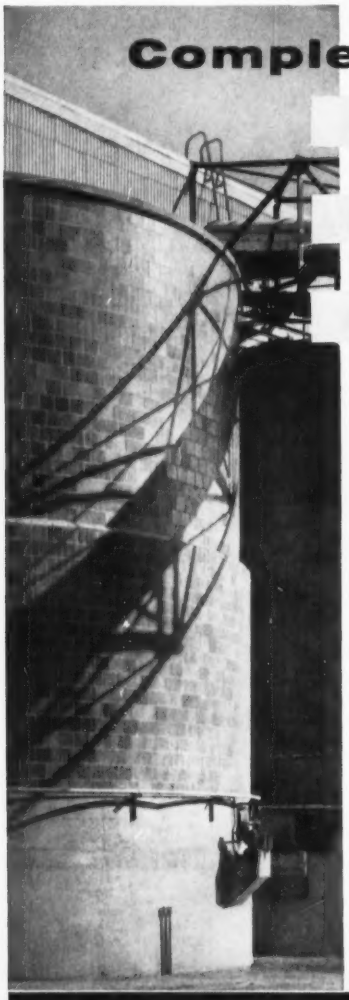
Projects Under Design

What is the current status of design work in Pennsylvania?

"We are overdesigned. We have more work already under design than we could complete in the next four or five years." However, Harral said this does not mean that the state will complete the projects already under design before retaining consultants for other projects. "We will not stop designing for two reasons — some priority projects may come up, and we need to plan for the future in order to know right-of-way needs."

What other complaints about consulting engineers do highway departments have?

Harral said that some consultants seem to feel that because they have been doing state highway design, the highway department should continue to give them projects timed to keep all their employees busy. Naturally, the highway department feels that an engineer's personnel problems are not the state's responsibility. ▲▲



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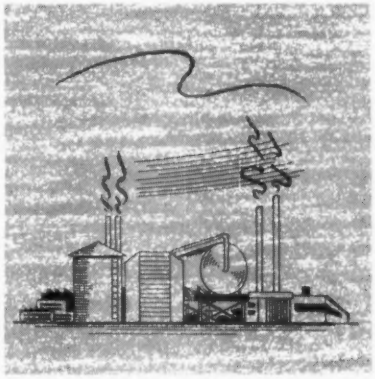

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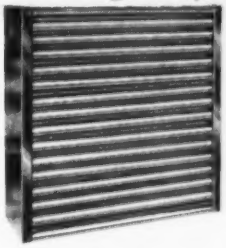

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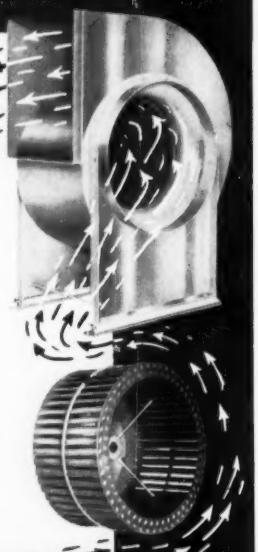

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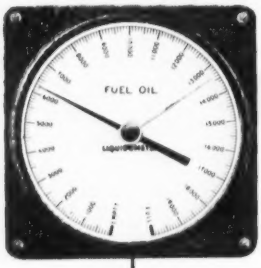

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News for the Consultant

The Narrows Bridge

The Port of New York Authority and the Triborough Bridge and Tunnel Authority will proceed immediately with the final details of the Narrows Bridge – to be the world's longest suspension span – connecting the boroughs of Brooklyn and Staten Island.

The bridge, with an over-all length of 2½ miles, will have a center suspension span 4260-ft long. This is 60 feet longer than the span of the Golden Gate Bridge, the longest existing suspension span. Side spans of the Narrows Bridge will be 1215-ft long. Vertical clearance over the channel at the middle of the suspension span will be 228 feet.

The design calls for a double-decked structure, with six lanes of traffic on each level. However, the lower deck will be constructed first; the upper roadway and its approach ramps will be erected when traffic demands.

Estimates are that during its first year of operation the Narrows Bridge will handle over 15 million vehicles. Its ultimate annual capacity is 48 million vehicles.

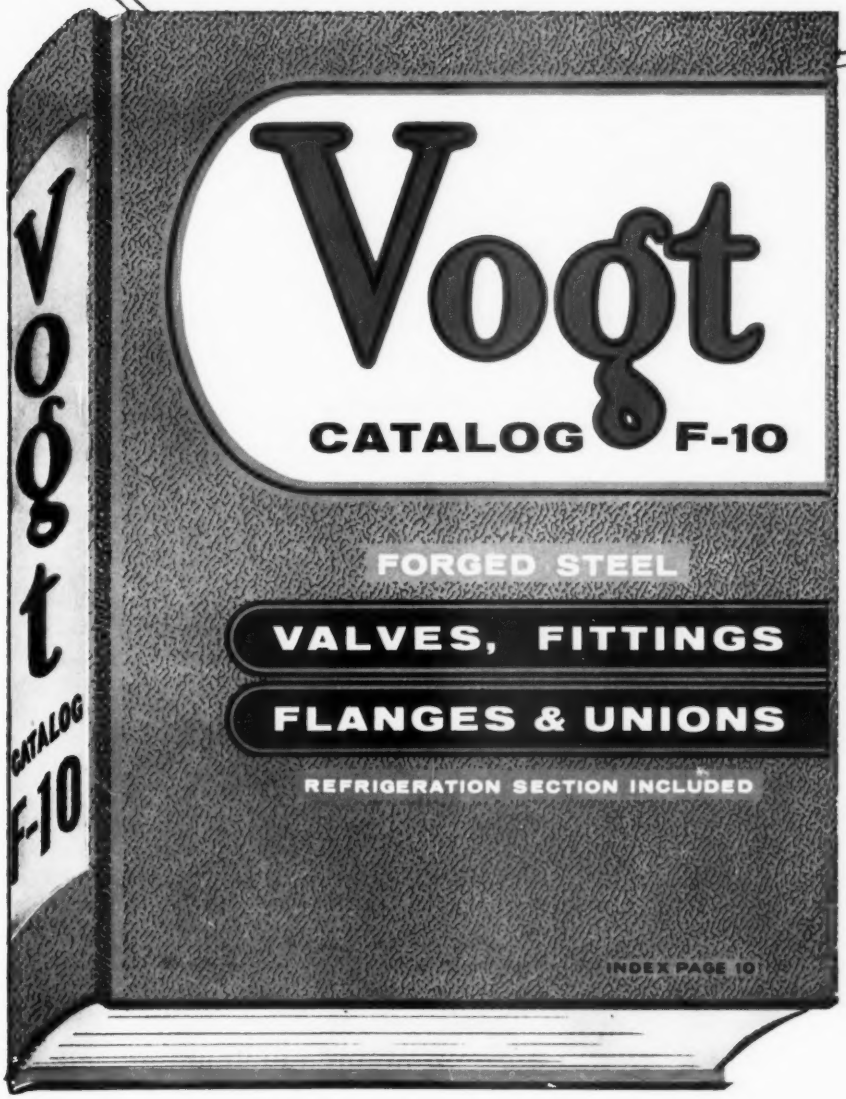
IN-FAB Facility Under Construction

A unique metals fabrication plant that is sealed within a building filled with argon gas will be used to process such space-age metals as columbium, molybdenum, tungsten, and tantalum. These materials react with constituents of the earth's atmosphere at the elevated temperatures necessary for their forming – from 3500 F to 4000 F – and require an inert gas blanket.

The 3200-sq ft hermetically sealed IN-FAB (in-

Presenting a NEW

Vogt Blue Book



Catalog F-10 is the one source for the most complete line of forged steel valves, fittings, flanges, and unions available to industry. Its 432 thumb indexed pages feature new types and trims to best meet severe fluid and gas handling duties at all temperatures and pressures.

A copy of this new catalog is available to you. Please send your request, on your company letterhead, to Dept. 24A-FCE.

Leading petroleum refineries, petro-chemical and chemical plants, and power plants get top performance with safety from Vogt forged steel valves, fittings, flanges, and unions.

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SPOT COOLING OR HEATING
PROBLEM—SPECIFY

THERMOTANK

round type punkah louvres

More than thirty years ago THERMOTANK engineers designed, developed and installed round punkah louvres (the original jet air outlet) in ships sailing to the Far East. Since its original application in ships, the effectiveness of THERMOTANK punkah louvres has been widely used on an ever increasing variety of applications.

HERE ARE SOME REASONS WHY:

1. Finger-tip adjustment projects air stream in any desired location.
2. Provides the most effective throw for its size and pressure.
3. Ideally used for air distribution in remote areas where branch ducts cannot be accommodated.
4. Draftless, quiet operation . . . easy to balance.

THERMOTANK round type punkah louvres are recommended for any cooling, heating or ventilating requirement. For complete engineering data on round punkah louvres, ask for catalog TA-150.

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high velocity units • punkah louvres
air diffusers • filters • exhausters
registers and grilles

Sold exclusively by representatives for:

AIR DEVICES INC.

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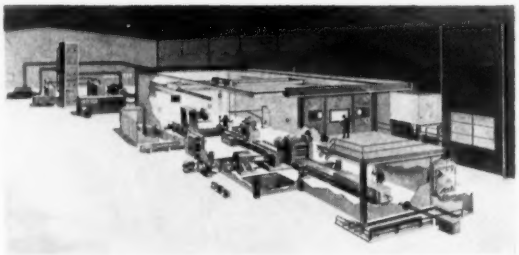
ert-fabrication) chamber will include a rolling mill, a horizontal impactor, and a crane. Ingots will be rolled into billets, bars, and sheets, and forgings for missile nose cones and rocket engine components will be produced. All parts will be protective coated to prevent oxidation and nitridation.

Technicians working in the 99.995 percent pure argon gas atmosphere will wear special suits, connected to hoses that supply conditioned air and exhaust carbon dioxide to prevent contamination of the inert atmosphere. Suits will be wired for telephone communication.



Separate personnel, equipment, material locks will be used to maintain purity of inert gas atmosphere.

The Rust Engineering Co. of Pittsburgh did the engineering design and will supervise construction of the facility. Tampa Bay Engineering Co., St. Petersburg, Florida, did the detail design work.

Needles Compressor Station is Enlarged

The Southern California and Southern Counties Gas Companies will add two 2000-hp turbo-charged natural gas compressors to its facilities at the Needles Station. This will bring the total number of compressors to seven and will increase the plant capacity to 328.8 million cubic feet per day. M. A. Nishkian & Co., consulting engineers of Long Beach, designers of the existing facilities, are preparing plans and specifications for the additions.

Mont Blanc Highway Tunnel

A highway tunnel now being constructed through Mont Blanc, the highest mountain (15,750-ft elevation) in Europe, will reduce the current highway mileage between Paris and Milan by 195 miles. The two-lane tunnel will link the Chamonix Valley in France with the Aosta Valley in Italy.

The 7.4-mile long tunnel will be 23-ft wide and 29½-ft high, and the design calls for a lining of concrete. Approximately 1.3 million cubic yards of rock will have to be excavated. It is planned to use a fine water spray in the interior of the tunnel

Approach area on the Italian side where tunneling for Mont Blanc project has just gotten under way.

to provide a temperature of about 70 F for comfortable driving conditions.

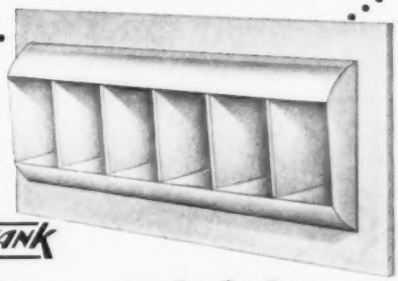
The new tunnel will be open to traffic all year around and is expected to carry 600,000 vehicles annually. It will contain 24 service stations, one every 1000 yards, on both sides of the road. In addition, there will be small recesses in the walls every 220 yards, large enough for one person.

The total cost of the tunnel, together with approaches in France and Italy, is estimated at $16 million. The governments of both countries are sharing equally the construction costs, with local authorities in Aosta and various Swiss interests also participating in the financing. The project is scheduled for completion in 1961.

San Diego Sewerage System

Holmes and Narver, Inc., Los Angeles, and James M. Montgomery, consulting engineer, Pasadena, a joint venture, have presented a report to the City of San Diego recommending a $41 million sewerage system. The plan provides for a system of interceptor sewers and pumping stations terminating at a new treatment plant located on Fort Rosecrans, Point Loma. The effluent from the plant will be dis-

FOR EXTREMELY LONG THROWS OF AIR IN LARGE AREAS OF ANY ENCLOSURE



THERMOTANK

drum type punkah louvres

Drum type punkah louvres originated by THERMOTANK engineers combine design and performance features that make them ideally suited for installation in large enclosures where extremely long throws are required.

THERMOTANK drum type punkah louvres are engineered to provide both horizontal and vertical control of the air stream. In addition, control of length of throw and its location is made possible by the rotating drum feature and adjustable vane design.

THERMOTANK drum type punkah louvres can be mounted in either a horizontal or vertical position without affecting the distribution of air from the outlet. This feature offers the architect and engineer unlimited application possibilities and does not restrict the location of the punkah louvres.

THERMOTANK drum type punkah louvres are highly recommended for installation in missile manufacturing plants, automobile assembly plants, aircraft plants, airport terminals, gymnasiums, arenas, in fact, any large enclosed area where air movement must be correctly distributed.

For complete engineering data on these punkah louvres, ask for catalog TA-150.

THERMOTANK — AGITAIR

high velocity units • punkah louvres
air diffusers • filters • exhausters
registers and grilles

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The Beaver Who Was Very Uneager

Once upon a time ...

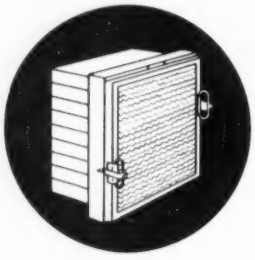
there was a beaver who seldom seemed to work. While the other beavers were busy with the gnawing problem of selecting air filters, their uneager buddy would slip away.

One day they discovered that he had been meeting his friendly Far-Air man down by the dam and had been busy checking on a sample Far-Air HP filter. When they saw how easy this preformed filter would be to install ... his secret was out! The beaver they thought was uneager had led them to a better filter ... by a damsite.

Now all the beavers specify the economical Far-Air HP.

Moral:

Compare before you specify. Far-Air HP filters may meet your air filter requirements better. Gnaw off the coupon below, drop it in the mail ... and relax.



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Timber-r-r! Send me the new HP Filter bulletin before the pond freezes over.

NAME _____

TITLE _____

COMPANY _____

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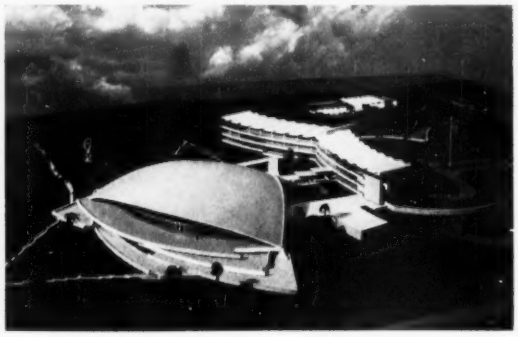
CITY & STATE _____

charged through an ocean outfall and a multiple-port diffuser located at a depth of about 220 feet more than 13,000 feet from the shore.

An alternate plan for disposal at Imperial Beach was rejected because of higher costs, nearness of the plant site to settled communities, and danger of pollution due to shallower water. Reclamation and reutilization of waste water for irrigation was rejected as too costly since it still would be necessary to use ocean disposal for the bulk of the sewage.

Liberian Executive Mansion

Stanley Engineering Company, consulting engineers of Muscatine, Iowa, has been awarded a $10,000 first prize in an international contest sponsored



Prize-winning design for new presidential residence.

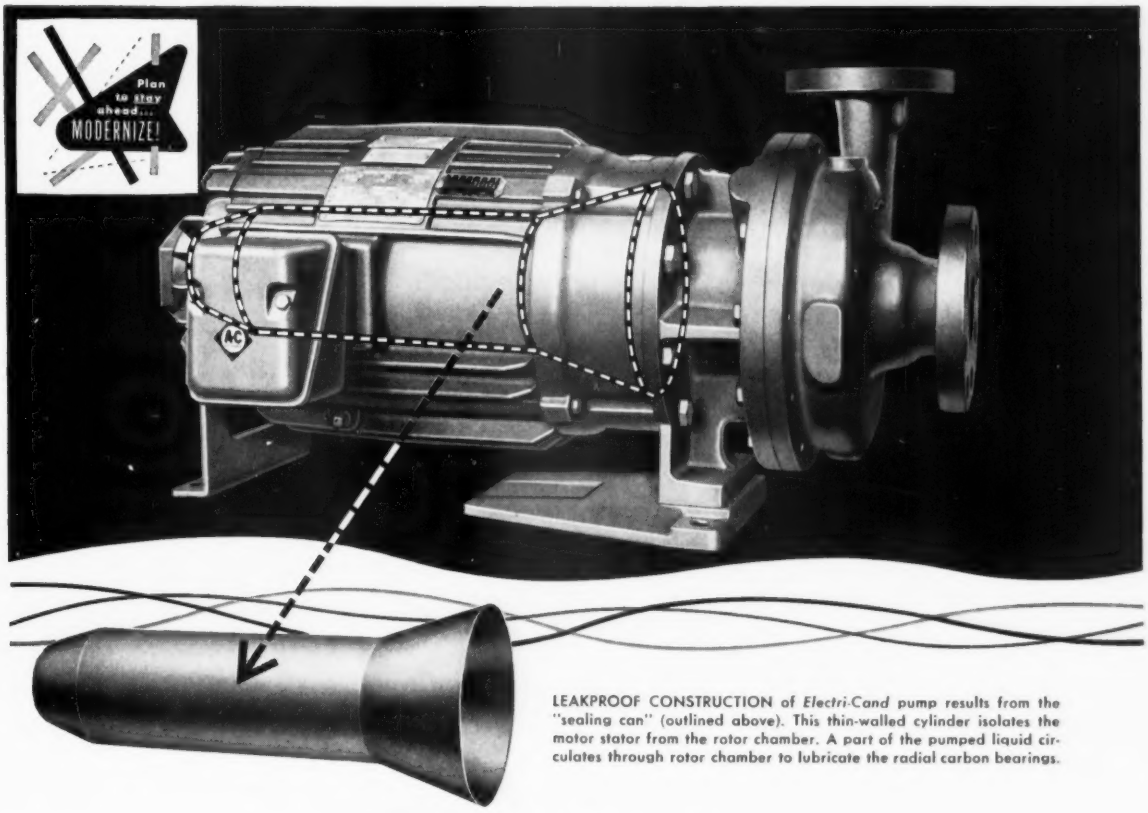
by the Republic of Liberia for the design of its new executive mansion. Entries were received from France, Israel, Italy, Spain, and the United States.

The presidential residence will be situated on a 20-acre tract in Monrovia, overlooking the Atlantic Ocean and facing the nation's capitol building. The main structure, four-stories high and of reinforced concrete, is 50-ft wide and 360-ft long. A one-story wing connects the mansion with an entertainment shell and provides kitchen area, storage, and service facilities. A 240-ft span reinforced concrete roof covers the entertainment shell.

Parking Lot Lighting System

By mounting mercury vapor luminaires 80 feet above Meyerland Plaza Shopping Center's 51-acre parking area in suburban Houston, Texas, consulting engineer James H. Howard & Associates saved his client $45,000 in installation and equipment costs. Clusters of ten 21,000-lumen units sit atop each of thirteen 70-ft steel poles set on 10-ft concrete pedestals. Illumination level is 1 footcandle.

The initial design of the lighting system called for more than 100 shorter poles, but the consultant



LEAKPROOF CONSTRUCTION of *Electri-Cand* pump results from the "sealing can" (outlined above). This thin-walled cylinder isolates the motor stator from the rotor chamber. A part of the pumped liquid circulates through rotor chamber to lubricate the radial carbon bearings.

New Electri-Cand Pump Just won't leak

Made to order for industrial applications where one drop of liquid loss is dangerous or costly! It's the *Electri-Cand* pump — developed by Allis-Chalmers.

ROTATING SEALS ARE ELIMINATED in *Electri-Cand* construction. This means even routine repacking or mechanical seal maintenance is no longer necessary. Overall design also means new pumping economy and safety in handling clear liquids such as chemicals, acids, alkalis, or poisonous liquids.

Models now in production include ¾ to 15-hp sizes. For additional information, contact your nearby Allis-Chalmers district office, or write to Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

Electri-Cand is an Allis-Chalmers trademark.

Developed for chemical and petrochemical applications

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A-5596

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Drip Tight
MERCOID®
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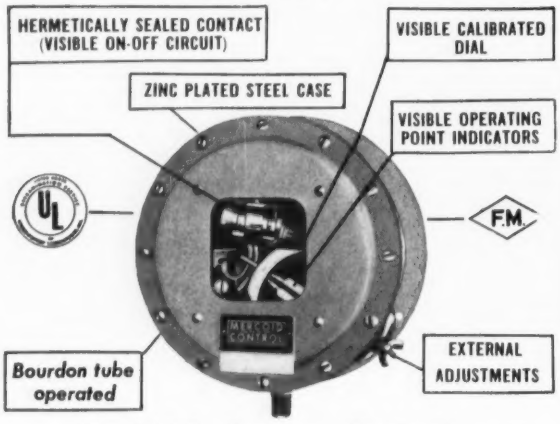
WEATHER RESISTANT·
CONTROLS
NEMA 1A, 2, 3, 4



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WRITE FOR BULLETIN 6-18

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from Air, Steam and other gas discharges
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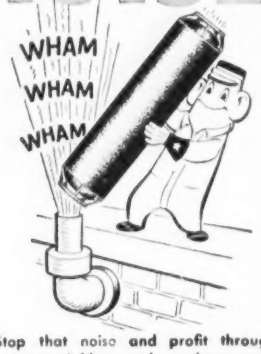


Stop that noise and profit through better neighbor and employee relations. Avoid compensation claims.
Burgess-Manning Snubbers are engineered to effectively correct your specific noise problem.

From a WHAM

Sound Engineering
BURGESS-MANNING COMPANY
9233 Sovereign Row, Dallas 35, Texas
Libertyville, Illinois

felt this number of lighting standards would interfere with smooth traffic flow during peak traffic hours. Although the lights are visible for great distances, nearby residents indicate there is no objectionable glare.

Mobile Offshore Oil Platform

A 1000-ton self-elevating offshore oil drilling platform, purchased by the Italian government from R. G. Le Tourneau, Inc. for its oil drilling operations in the Persian Gulf, has arrived in Iran after a three-month journey. The giant triangular platform can be raised and lowered on its three 120-ft long legs at the rate of one foot per minute. After a well is drilled, the platform is designed to be quickly and economically towed to another location.

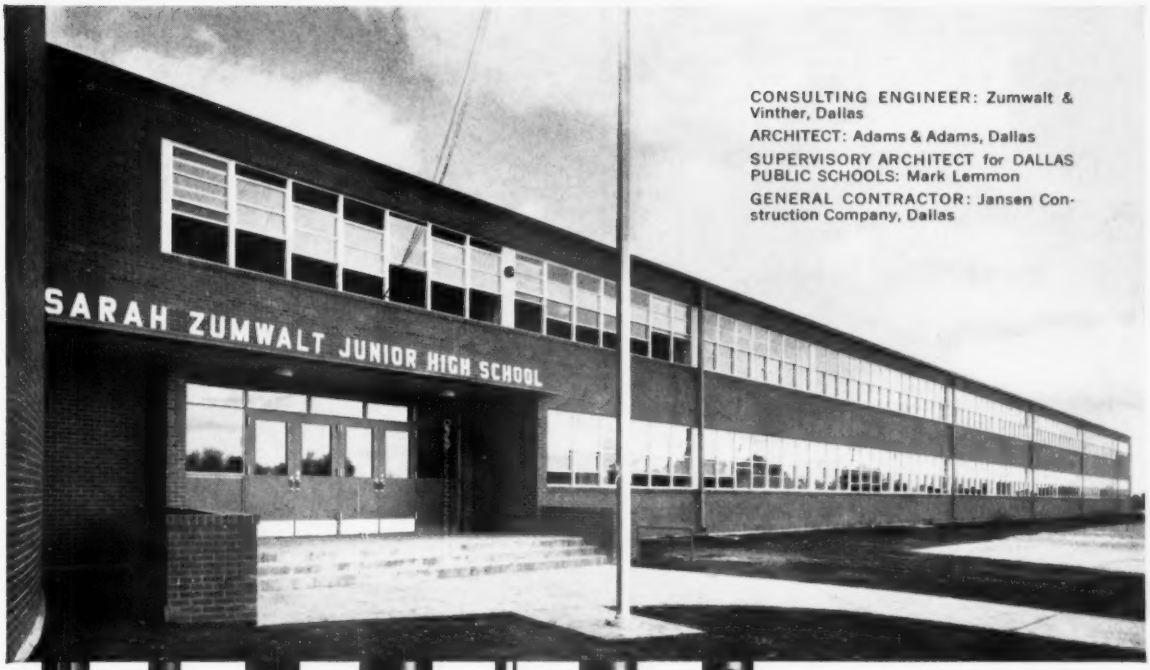
Triangular hull of platform is 120 x 115 x 13 feet. Ballast tanks in bottom of legs provide stability.

Triangular Steel Frame Church Design

Employing the triangle as a geometric form symbolic of the Trinity, architect Wilfred E. Blessing, San Jose, California, and structural engineer H. Neil Warren, Warren and Siebert, Palo Alto, have developed an unusual design for the new Sunnyvale First Congregational Church.

The design involves a relationship with the triangles so that they only touch the ground at their points. Where the structural steel members intersect in opposing triangles, greater strength is achieved with a minimum of material. Window areas, which are free of structural elements, have large stained glass surfaces.

Basic framing details were laid out in a series of three different sizes of equilateral triangles. The basic frame for the sanctuary is 52 feet; the chapel and choir frames and those of the larger windows are 33 feet, 4 inches; and the triangular

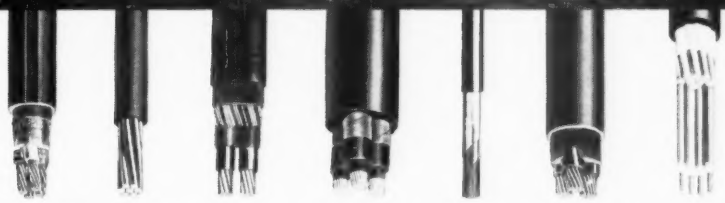


CONSULTING ENGINEER: Zumwalt & Vinther, Dallas

ARCHITECT: Adams & Adams, Dallas

SUPERVISORY ARCHITECT for DALLAS PUBLIC SCHOOLS: Mark Lemmon

GENERAL CONTRACTOR: Jansen Construction Company, Dallas



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"We've never had to replace a foot of Roebling Electrical Wire or Cable"

says Mr. Rob Roy, of Rob Roy Electric, Inc., Dallas, Texas, electrical contractor for the beautiful new Sarah Zumwalt Junior High School.

"As members of NECA," Mr. Roy continues, "we firmly believe in the Association's stand for one-year guarantee on electrical workmanship and materials. And were there any wire failure in the more than 30 miles of wiring we installed in this new Dallas school, it would cost us more than $12.00 per foot to replace it! We used 100% Roebling electrical wiring in this contract because, over the years, we've learned that Roebling is completely dependable and reliable."

Rob Roy Electric, Inc., leading Southwest contractors for nearly 30 years, can't afford to take chances. That's why Rob Roy, like so many companies, depends on Roebling to meet most *every* wire and cable requirement. The Roebling line includes virtually all the wire and cable products you'll ever need. And Roebling is constantly at work developing new and improved products to serve you even better. Examples: Roebling's revolutionary ROECLAMPS® aerial suspension clamps with associated cables . . . Roebling's new control cable, with its easier-to-identify "inlaid-stripe" color code.

Remember: when the name "Roebling" is on your specifications, it's a sign you're doing the very best job you can do. Add Roebling's "pride of workmanship" to yours—and you have a team that's unbeatable for building a reputation for dependable, quality work! There is a Roebling Distributor nearby to give you fast service. Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

solves movement and temperature problems in curtain wall joints

Movement due to winds and temperature extremes pose a trying problem for designers of curtain wall buildings. The joint material must seal out water, dust and air but must remain flexible and resilient under these conditions. Hornflex, a thiokol formulation, provides a squeeze-stretch range of 325% and stays firm and elastic over a temperature range from *50°F BELOW ZERO to 250°F.*

Other uses for Hornflex are to fill and seal surface joints in bridges, highways, swimming pools, etc. Laboratory test and job applications indicate that Hornflex, properly installed, will provide excellent protection for periods up to *25 years and more.*

Like complete details? Write for Hornflex Technical Bulletin to Dept. H51-1229.

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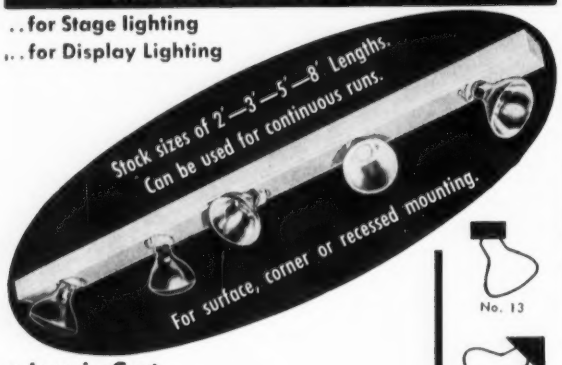
ADJUSTABLE . . . ACCENT LIGHTING
NEO-RAY ROTO-STRIP
U. L. & C. S. A. Approved U. S. Pat. No. 2,790,894; Pat. in Can.

. . for Stage lighting
. . . for Display Lighting



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This complete, compact, adjustable, shallow unit . . . with built-in, recessed roto sockets, finger-tip adjustment . . . swings 90 degrees in all directions through a complete 360 degree circle. Stays put at any angle.

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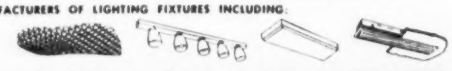
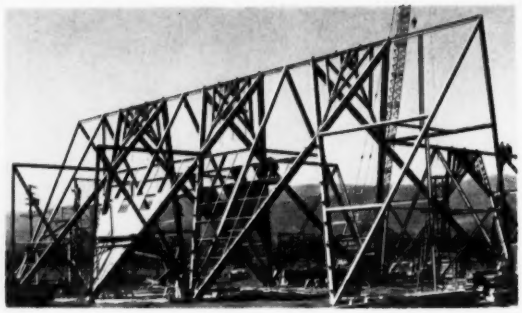


Louvred Ceilings • Roto-Strip • Luminette • Kleen-Vu KVT Troffers

NEO-RAY PRODUCTS, INC.
315 East 22nd St. • New York 10, N. Y.



Only seven days were required to erect triangular structural frame for church of unusual design.

windows are 22 feet. The skylights are also equilateral in form, intersecting the frames composing the windows. The large sanctuary frames are spaced on 33 feet, 4 inch centers. At their base, they tie in with the diagonals of the frames forming the window bays and chapel and choir wings. Where these diagonals intersect in the plane of the sanctuary triangle, they form rigid shear panels.

Since the steel was designed to take all the load, the voids in the structure could be covered with lighter materials – redwood siding and panels of stained glass. This also adds to the effectiveness of the banks of fluorescent lighting tubes in the skylight areas which give daylight illumination at night.

Most of the welded connections were prefabricated, with the structural members designed to be shipped in small sections and bolted together at the site with a minimum of field welding.

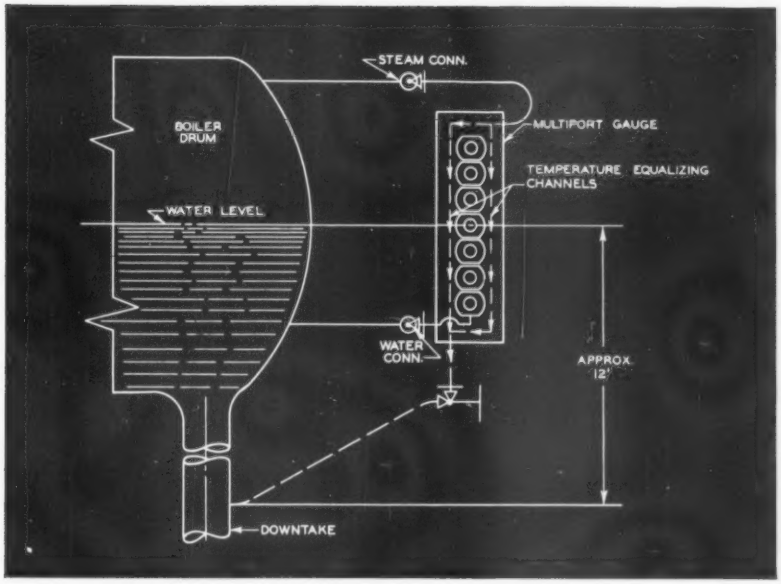
Miami Airport Development

Landrum & Brown, Cincinnati engineering firm, has advised the Dade County Port Authority that air traffic in the Miami area will triple by 1970. The firm's report indicates that one additional commercial and two general airports are needed immediately with four more required for future expansion. An aviation committee of the Fort Lauderdale Chamber of Commerce in neighboring Broward County – recommended as a suitable site for construction of a major airline terminal – already is on record in favor of an airport there.

Delaware-New Jersey Agency

Governors of Delaware and New Jersey have agreed to the creation of a bi-state agency to handle problems concerning traffic crossings of the Delaware River and Bay between the two states. Committees have been set up to work out existing inequities over consignment of tolls of the Delaware Memorial Bridge and to study the feasibility of a new bridge and a Lewes-Cape May ferry. ▲▲

ANOTHER NEW GAUGE DEVELOPMENT BY Diamond



Diagramatic illustration of new Diamond Temperature-Equalizing Multi-Port Gauge installation.

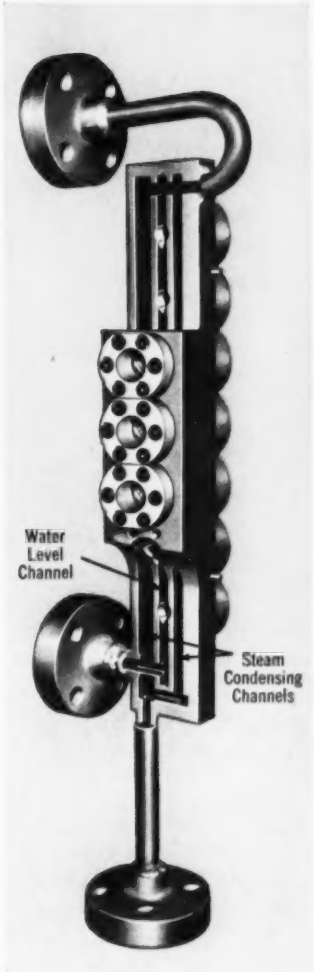
The need for correction of inherent gauge error at high operating pressures is well recognized, but heretofore no satisfactory simple answer has been found. Now, Diamond has developed the Temperature-Equalizing Multi-Port Gauge* to reduce the error in gauge level reading by a simple and fully reliable means.

Gauge error (resulting from the gauge temperature being lower than boiler saturation temperature) is substantially avoided by introducing supplementary gauge heating in the form of steam condensing channels. These channels are parallel to the gauge water level channel as illustrated, and serve to heat the gauge level channel by direct conduction of heat from condensing steam through the gauge body itself. No external source of energy or control is required. The heating channels have a natural circulation system independent of the gauge level channel so that no faulty operation can occur under any circumstance.

Ask your local Diamond office or write directly to Lancaster, Ohio for Form 2150 for further information.

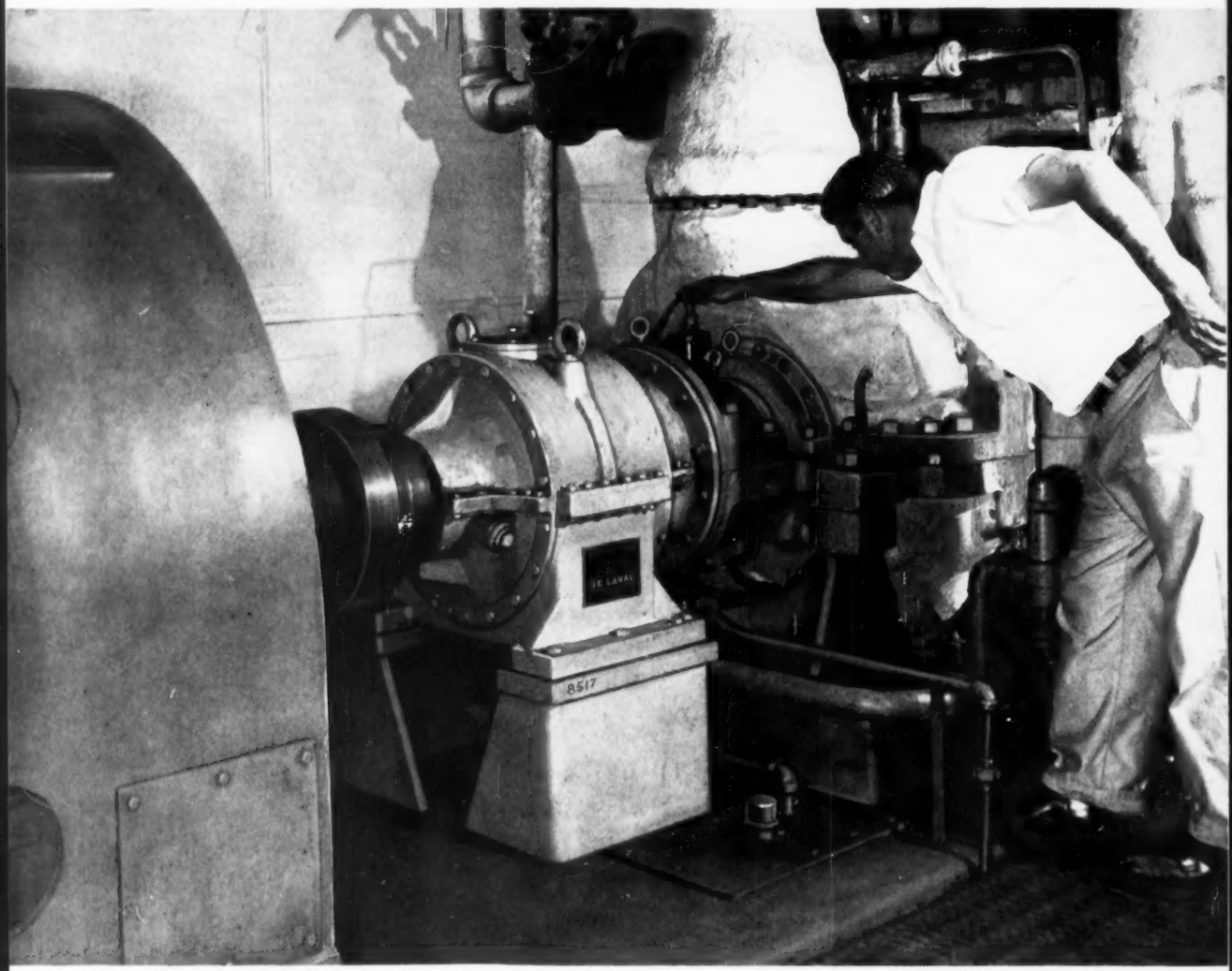
*Patent Applied For 8031

DIAMOND POWER SPECIALTY CORP.
LANCASTER, OHIO
DIAMOND SPECIALTY LIMITED—Windsor, Ontario



Cut-away sections illustrate independent gauge body heating channels of the new Diamond Temperature-Equalizing Multi-Port Gauge.

Creative Engineering by DE LAVAL



De Laval-Stoeckicht Gear at Homasote Co., Trenton, N. J.

2800 Horsepower in a 22" package!

That compact "package" you see in the center of the picture above is a De Laval-Stoeckicht Planetary Gear. Developed by W. G. Stoeckicht in Germany, this gear has been proved in hundreds of European installations. It is capable of transmitting 2800 horsepower from the steam turbine at the right to the generator at the left. It weighs only 900 pounds. A conventional gear for this service would weigh 4000 pounds. And the De Laval-Stoeckicht gear takes up less than half the space of a conventional gear. This is another example of how De Laval *creative engineering* plus precision manufacturing and highest quality control assure lasting customer satisfaction.

DL 440

DE LAVAL *Steam Turbine Company*

894 Nottingham Way, Trenton 2, New Jersey

DE LAVAL

builds these products...

- **Centrifugal pumps**
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"Men, Machines and Materials at De Laval."
De Laval Steam Turbine Company
894 Nottingham Way, Trenton 2, New Jersey

Men in Engineering

R. A. Ransom Company, Inc., consulting engineers of Washington, D. C., have opened an office at 61 Broadway, New York, N. Y. Head of the new office is Lester Simon who recently became associated with the firm and has been elected a vice president and director. Simon formerly was a general partner of W. C. Gilman & Co., public utilities engineering and financial consultants of New York City.

SIMON

SCHOENFELD

David M. Schoenfeld, formerly executive assistant to the vice president of Combustion Engineering, Inc., has established a consulting engineering practice with headquarters in New Canaan, Connecticut. Schoenfeld will specialize in problems relating to all phases of stationary, marine, and nuclear steam power plant design, engineering, construction, and project management.

Ralph W. Olmstead has been named president of The H. K. Ferguson Company, Cleveland engineers and builders. Olmstead formerly was executive vice president of the firm. In other action taken by the board of directors, the retiring president, Wells N. Thompson, was elected vice chairman of the board.

OLMSTEAD

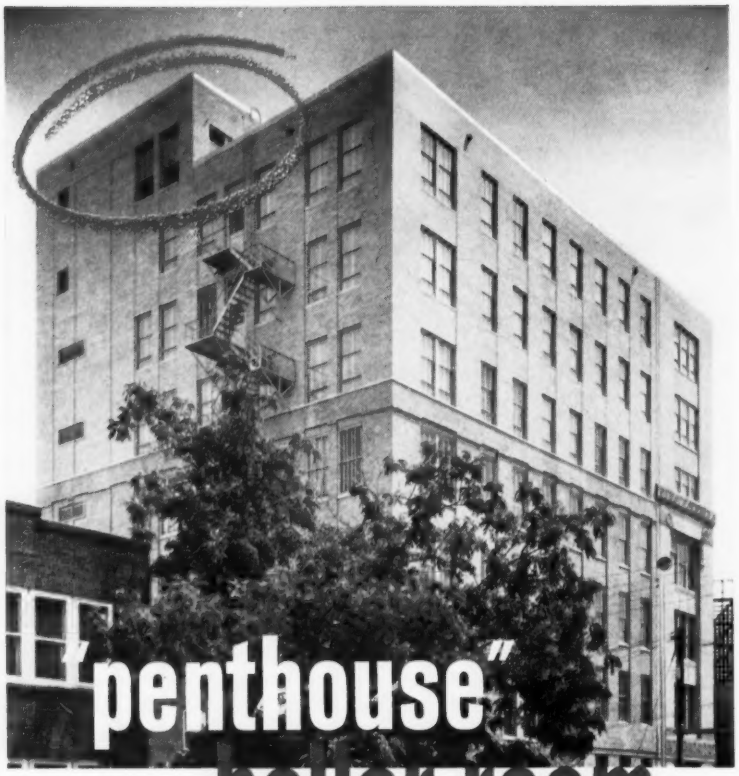
AUFMUTH

Announcement also was made of the appointment of Raymond B. Aufmuth as chief engineer of the firm. Formerly staff engineer in the firm's main office in Cleveland, Aufmuth, in his new position, will direct and coordinate all engineering activities of the company's world-wide operations.

Brender and Brender, Inc., Engineers & Architects, have moved their office to 3911 Newberry Street, Wayne, Michigan.

A new firm, Harrison, Lusich and Associates, 2019 24th Street, Bakersfield, California, has been formed for the practice of general civil consulting engineering.

Charles A. Maguire & Associates, engineers of Providence, Rhode Island and Boston, Massachusetts, have admitted the following as



"penthouse" boiler room

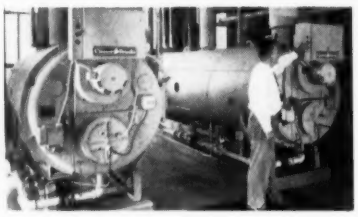
Cleaver-Brooks boilers at Lone Star Gas Company, *Ft. Worth, Texas*, demonstrate advantages of compact design and reliable, low-cost operation in year-round dual use of steam

The installation — these two Cleaver-Brooks 100-hp gas-fired boilers in penthouse boiler room atop eight-story office building, according to A. E. Emmet, Industrial Engineer, "are providing all steam needed for both heating and cooling of the entire building."

The advantages — "So compact are these CB boilers, we have almost five times the steam capacity in our penthouse that we had in an equivalent basement area. Our choice of 100-hp boilers was dictated by our new 236-ton absorption air conditioning unit which uses approximately 20 lbs. of steam per ton-hour's operation."

Efficiency — Mr. Emmett continues, "Since the Cleaver-Brooks boilers operate at a guaranteed minimum efficiency of 80% (as opposed to the 70% top for former boilers), our operating costs have been reduced about 10%, resulting in significant fuel savings per unit of steam produced.

"Further, the CB boilers guarantee 99% dry steam. Also, undivided responsibility for the design of a package-type boiler always works out to the customer's advantage and all parts are built to work as a unit."



Lone Star's two Cleaver-Brooks boilers are Model CB-700-100, 15-lb. design . . . deliver consistent, trouble-free service — 3000 lbs. per hr. in summer, 1000 lbs. per hr. in winter.

Cleaver-Brooks packaged boilers simplify installation, cut operating costs. For complete information, write Dept. B, 321 E. Keefe Ave., Milwaukee 1, Wisconsin.

Cleaver Brooks®

ORIGINATORS AND LARGEST PRODUCER OF PACKAGED BOILERS

associates to the firm: Harold Bateson, Gordon Bronson, Peter V. Cipolla, Thomas C. Murphy, Robert L. Pare, Francis C. Pierce, and Eric Reeves. Wendell S. Brown and Edward O. Greene have been named special consultants to the firm. Partners are Grant H. Potter, Frederick H. Paulson, Milton E. Nelson, and Howard W. Holmes.

Battey & Childs, Chicago engineering-architectural firm, has changed from a partnership to a corporation. Officers and directors of the

CHILDS WIER

new corporation are: Leonard C. Childs, president; Robert J. Wier, vice president; E. G. Engdahl, secretary; and Mrs. J. C. Hobbs, treasurer. Paul L. Battey, former partner, is consultant.

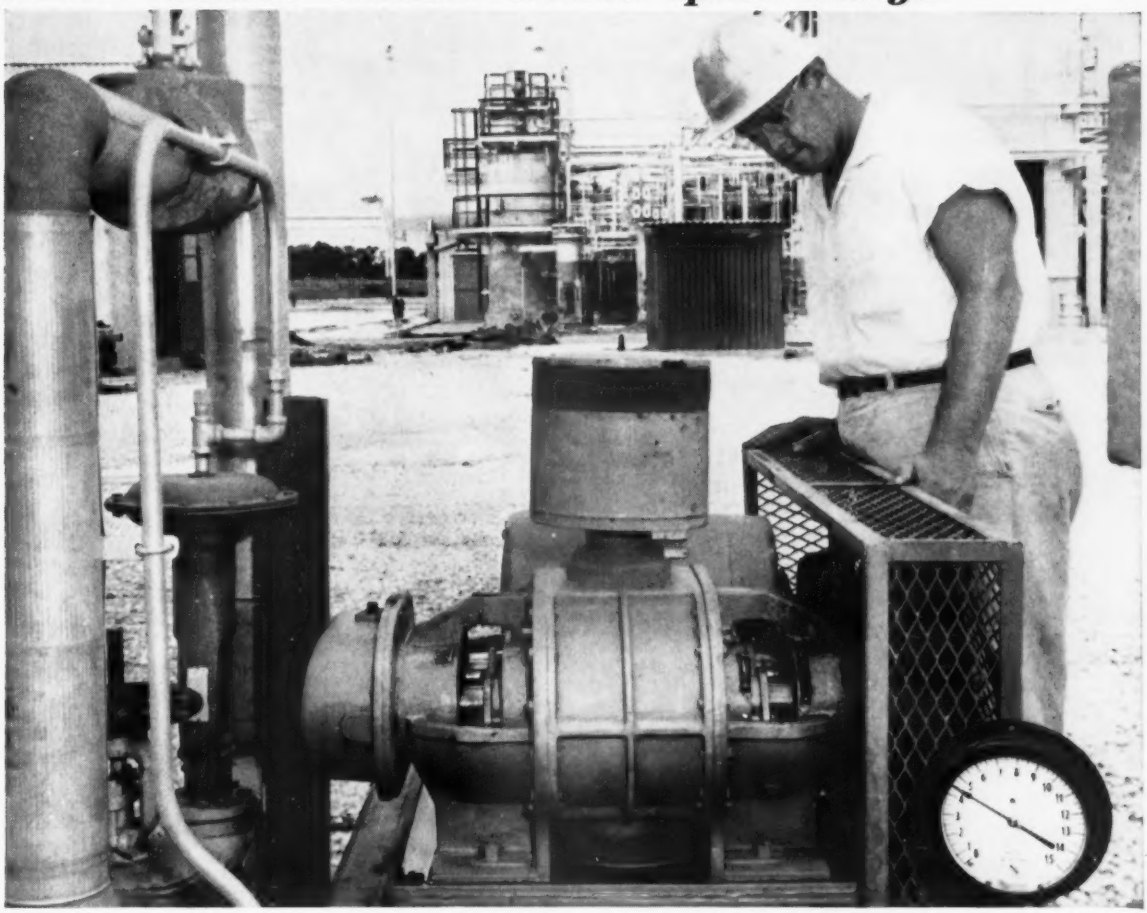
Andrew C. Paton has become a partner of Metcalf & Eddy, Engineers of Boston, Mass. Paton has been serving as director of operations in the firm's Boston office.

Ernest V. Manning has been named a project architect with A. M. Kinney Associates, engineering and architectural consultants, of Cincinnati and New York. Manning formerly was an architect with Alfred C. Finn, Houston, and has designed a variety of structures.

Benjamin Gray has been named a general partner of De Leuw, Cather & Brill, Engineer-Architects, of New York City.

B. J. Whitlow, division manager of Wilsey and Ham Engineers and

where blower failure would spell Danger



Sutorbilt blower at Polymer Chemicals Division plant in Baton Rouge, La. Blower is required at a critical phase of catalyst activation in a new Phillips-type polymerization process.

W. R. GRACE DEPENDS ON A SUTORBILT ROTARY, POSITIVE-PRESSURE BLOWER

At W. R. Grace & Co.'s new Polymer Chemical Division, the catalyst for a new, high-density polyolefin production process must be protected in a pressurized air stream. A doubly-dependable Sutorbilt rotary positive-pressure blower was selected for these three important reasons:

1. Contamination must be avoided
Long-lasting, air-tight, Teflon seals and lack of lubrication in compression chamber prevent air contamination in a Sutorbilt blower.

2. Breakdowns would be dangerous
Simple, rugged, precision construction (only rotors and bearings move) means reliable service. Unit chosen by Grace has been in continuous operation for well over a year without repairs.

3. Pressure must be positive, constant
The two, counter-rotating "figure eight" Sutorbilt impellers produce a positive-pressure, *metered* air supply.

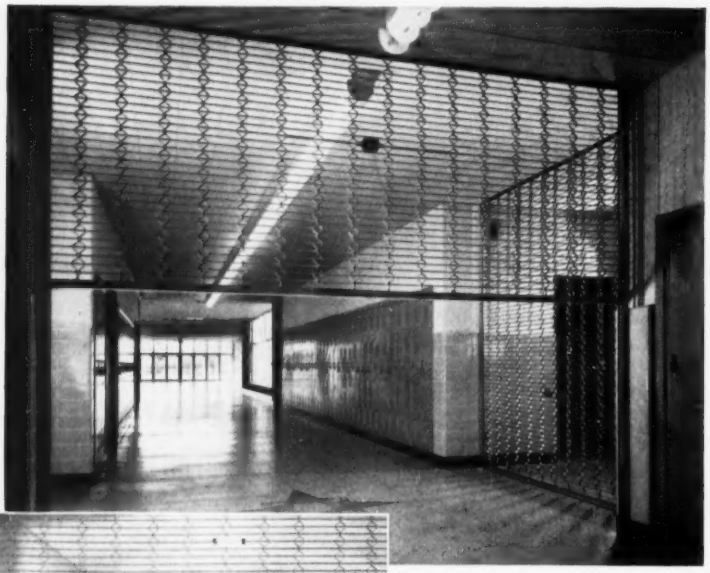
Sutorbilt blowers and gas pumps are precision-built to deliver air or gas in capacities up to 20,000 cubic feet per minute—at pressures up to 10 pounds. Write today for complete, illustrated literature on these efficient, dependable blowers. 1349 S-16

SUTORBILT IS WELL BUILT

CORPORATION, 2966 EAST VICTORIA ST. • COMPTON, CALIF.
SUBSIDIARY OF FULLER COMPANY • CATASAUQUA, PA.

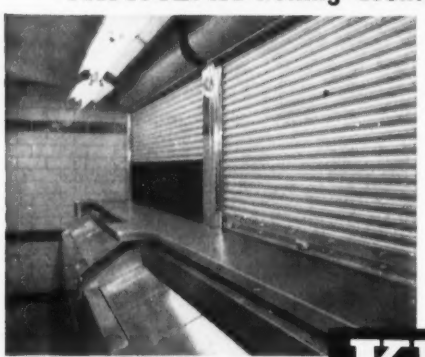
Kinnear Steel Rolling Grilles
CONTROL SPACE

without blocking light, air, sound or vision



Coils Out of View When Not in Use! Artistic, modern beauty and great strength *plus space-saving convenience!* Kinnear Rolling Grilles are ideal for "space control" — closing off corridors, bays, or other room areas. Curtain of heavy round bars locked in rugged steel links defies burglars, trespassers, vandals. Coils upward, stays out of view until closed and locked. Heavily galvanized for lasting beauty (aluminum or bronze also available). For face-of-wall or under-lintel mounting. Any size. Manual or motor control. Send for full information.

KINNEAR Rolling Counter Shutters Also Provide Space-Saving Protection



The counter shutter that coils upward, completely out of the way! Protects with a rugged all-metal curtain when lowered. Made like the famous Kinnear Steel Rolling Doors used so widely in service openings of all types, but with a curtain of one of Kinnear's "midget" slats. For all counter openings up to 20' wide. Steel, aluminum, bronze, or stainless steel. Write for details.

The KINNEAR Mfg. Co.
FACTORIES:
1560-90 Fields Avenue, Columbus 16, Ohio
1742 Yosemite Ave., San Francisco 24, Calif.

KINNEAR
ROLLING DOORS
Saving Ways in Doorways

Planners, Millbrae, Calif., has been elected state director of the California Society of Professional Engineers to represent the Marin County Chapter of the engineering organization.

Cecil H. Wells, Jr., consulting structural design engineer, has opened new offices at 2006 Pioneer Court, San Mateo, California.

WELLS

GANNETT

J. K. Gannett, vice president in charge of all engineering and research of The Austin Company, engineers and builders, Cleveland, Ohio, and nationally recognized for his engineering leadership and pioneering in the industrial and commercial building field, has retired after 43 years with the firm.

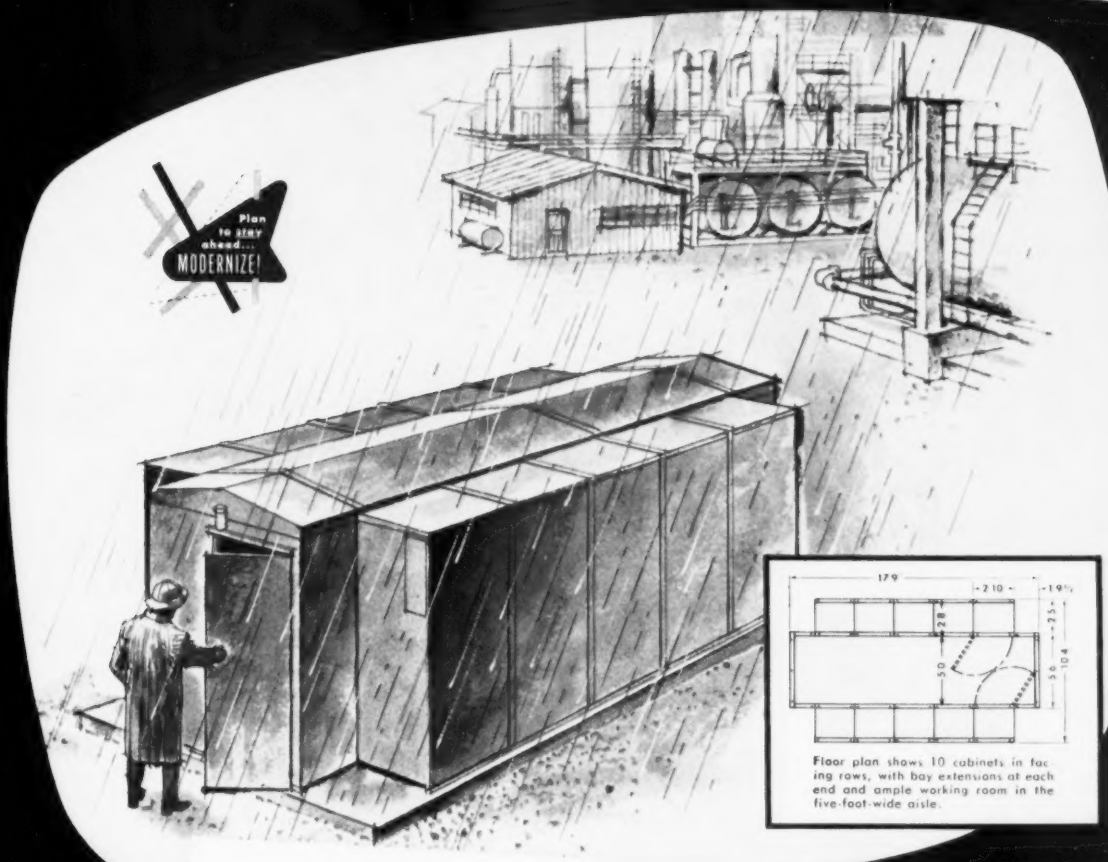
Testing Engineers, Inc., San Diego, Calif., has become associated with Woodward-Clyde-Sherard and Associates of Oakland, and will open a Northern California division at 1150 28th St., Oakland.

Woodward-Clyde-Sherard has opened a San Diego office to be housed later in Testing Engineers' new $100,000 administration building and laboratory to be constructed at the firm's present address, 3467 Kurtz St.

Announcement also was made of a merger with Greer Engineering Associates, Inc., consulting foundation engineers, Montclair, New Jersey. David M. Greer is in charge of the New Jersey office, which will operate under the name of Greer Engineering Associates, Inc., a division of Woodward-Clyde-Sherard and Associates. ▲▲

full SCOPE of
MOTOR CONTROL from...

ALLIS-CHALMERS



Floor plan shows 10 cabinets in facing rows, with bay extensions at each end and ample working room in the five-foot-wide aisle.

Let it rain, snow or blow...

New, *Shelter-Clad* walk-in enclosures provide complete protection for personnel and motor control

With the new Allis-Chalmers all-steel, walk-in enclosure, you can eliminate expensive, permanent buildings. Your field personnel can carry on inspection and maintenance work in complete safety and convenience, regardless of the weather. *Shelter-Clad* units can even be arranged to provide space for your field office work.

Simple, Flexible Packaged Units

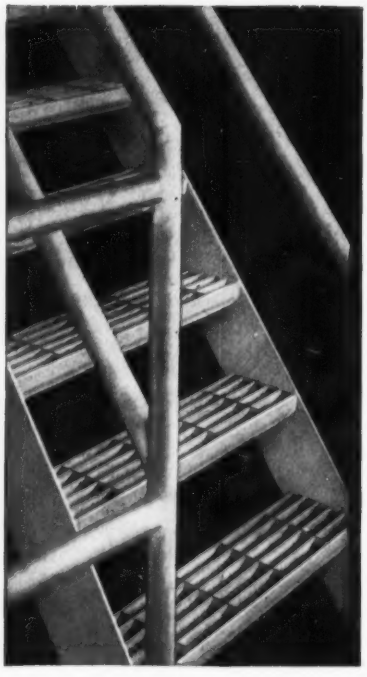
Two facing rows of Allis-Chalmers Type H, 2000 to 5000-volt motor controllers are bridged by a sturdy metal roof with the backs of the control cabinets forming the outside walls. A five-foot-wide aisle, extending the length of the unit, is enclosed with doors at each end. A basic unit can consist of any number of facing cabinets — and any number of pairs of cabinets can easily be added or removed. These units meet NEMA 3 and 4 standards for weather resistance.

For details, contact the A-C office near you, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

Shelter-Clad is an Allis-Chalmers trademark.

A-C ALLIS-CHALMERS

A-5001



SHUR-SITE TREADS
...the best step for
SAFETY

Hendrick Shur-Site Treads have a non-slip surface that *insures* safety, making them the best choice for your stairs, ladders and fire-escapes. A heavy nosing bar provides reinforcement where the load is greatest. Shur-Site Treads are constructed by a pressure forming process, and so have no angle irons, bolts or rivets to collect dirt and refuse. Their 90% open area lets in plenty of light and air.

Shur-Site Treads are available in standard sizes or in special widths and lengths. They are shipped ready to bolt directly to stair stringers.

Hendrick
MANUFACTURING COMPANY
42 DUNDAFF STREET, CARBONDALE, PA.
Sales Offices in Principal Cities

New Projects Reported

By Consulting Engineers

ALABAMA

L. M. Dickinson
Columbiana, Alabama
¶ Steam plant, Wilsonville, Ala. (mech.) Client, Alabama Power Company.

CALIFORNIA

Ben B. Lezin, P.E.
San Francisco, California
¶ Plumas District Hospital, Quincy, California. (elec.) $65,000. Client, Cox-Liske-Associates, Sacramento, Calif.
¶ Plumas County nursing home, Quincy, California. (elec.) $52,000. Client, Cox-Liske-Associates, Sacramento, Calif.
¶ Mira Loma high school, Sacramento County, California. (elec.) $450,000. Client, Cox-Liske-Assoc., Sacramento, Calif.
¶ Juvenile center for Santa Clara County, San Jose, Calif. (elec.) $175,000. Client, Allan Walters & Assoc., San Jose, Calif.
¶ Safe-T-Pacific Baking Co., Redwood City, Calif. (elec.) $30,000. Client, John S. Bolles, Architect.
¶ Scientific Book Service, storage and office, Palo Alto, Calif. (elec.) $28,500. Client, John S. Bolles, Architect.
¶ Werner's Shoe Store, remodeling, San Francisco, Calif. (elec.) $27,000. Client, John S. Bolles, Architect.
¶ Unitarian Church, Palo Alto, Calif. (elec.) $21,000. Client, Joseph Esherick, Architect.
¶ Y.W.C.A., Berkley, Calif. (elec.) $36,000. Client, Joseph Esherick, Architect.
¶ Childrens' center, U.C. campus, Berkeley, Calif. (elec.) $18,000. Client, Joseph Esherick, Architect.
¶ Stern Hall addition, U.C. campus, Berkeley, Calif. (elec.) $25,000. Client, Wurster, Bernardi & Emmons, Architects.

R. E. Layton & Associates
San Leandro, California
¶ Complete engineering service for corrugated container plant, Santa Fe Springs, California. Building, 300 feet x 400 feet, precast concrete, tilt-up construction. (civil, struc., mech., elec.) $800,000 (building), $1.5 million (mechanical production machinery). Client, American Forest Products Corporation, San Francisco, California.
¶ Design improvements to municipal water system, including two pumping plants, prestressed water storage reservoir, and pipelines. (civil, struc., mech., elec.) $500,000. Client, City of Redding, Calif.
¶ Precast concrete plant addition for plastics and lead lining company. (civil, struc.) $50,000. Client, New England Lead Burning Company, San Leandro, California.

Charles O. Greenwood, Jr.
Sacramento, California
¶ Road design, Sacramento, California. (civil) $500,000. Client, U.S. Army Corps of Engineers.

Black and Associates, Inc.
Gainesville, Florida
¶ Recalcining plant, San Diego, Calif. (civil, struc., mech., elec.) $450,000. Client, City of San Diego, Calif.

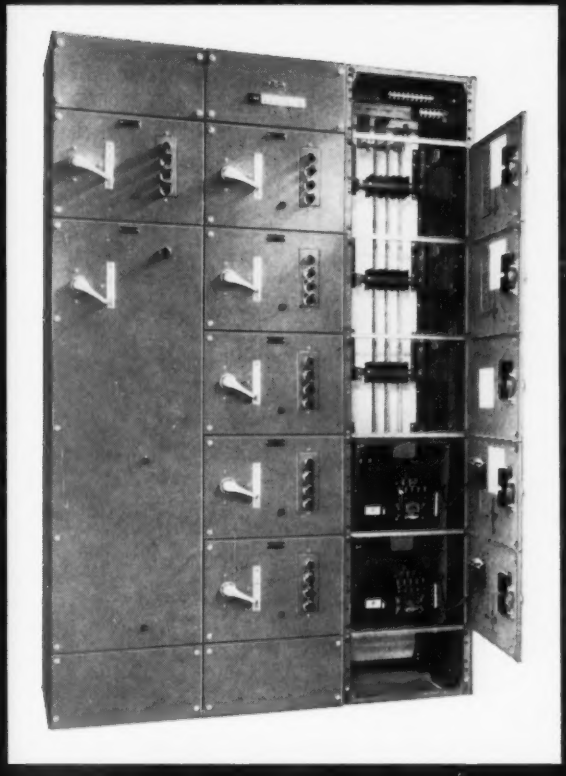
George K. Brokaw
San Francisco, California
¶ Cooke junior high school, Santa Rosa, Calif. (mech., elec.) $1.5 million. Client, Steele & Van Dyk, Santa Rosa, Calif.
¶ Industrial plant, Mountain View, Calif. (mech.) $2 million. Client, Sylvania Electrical Products Co., Williamsport, Pa.
¶ Commercial development. (mech., elec.) $13 million. Client, Garden Development Co., Santa Rosa, Calif.

COLORADO

Ken R. White
Denver, Colorado
¶ Public works department building, U. S. Naval air station, Denver, Colorado.

In Control Centers...

Federal Pacific gives what you're looking for



RELIABILITY

BOLTED CONSTRUCTION—11-gauge formed channels bolted together for maximum structure rigidity.

POSITIVE PLUG-IN CONTACTS—special beryllium copper alloy stabs provide high-pressure, low-resistance unit-connections to silver-plated bus.

TESTED TO WITHSTAND 25,000 AMP RMS SHORT CIRCUIT STRESSES.

FLEXIBILITY

PREPUNCHED STRUCTURES—for unmatched job flexibility...individual units or complete sections can be added, removed or interchanged to meet varying job requirements—present and future.

COMPACT DESIGN—up to 20 units can be mounted in a single vertical section.

EASY WIRING—oversize wiring spaces simplify initial installation and facilitate change of units.

SAFETY

UP-FRONT UNIT RELEASE—completely disengages unit from energized bus... can be locked in open position to prevent accidental contact.

FULLY ENCLOSED UNITS—steel barriers isolate each unit from adjacent parts.

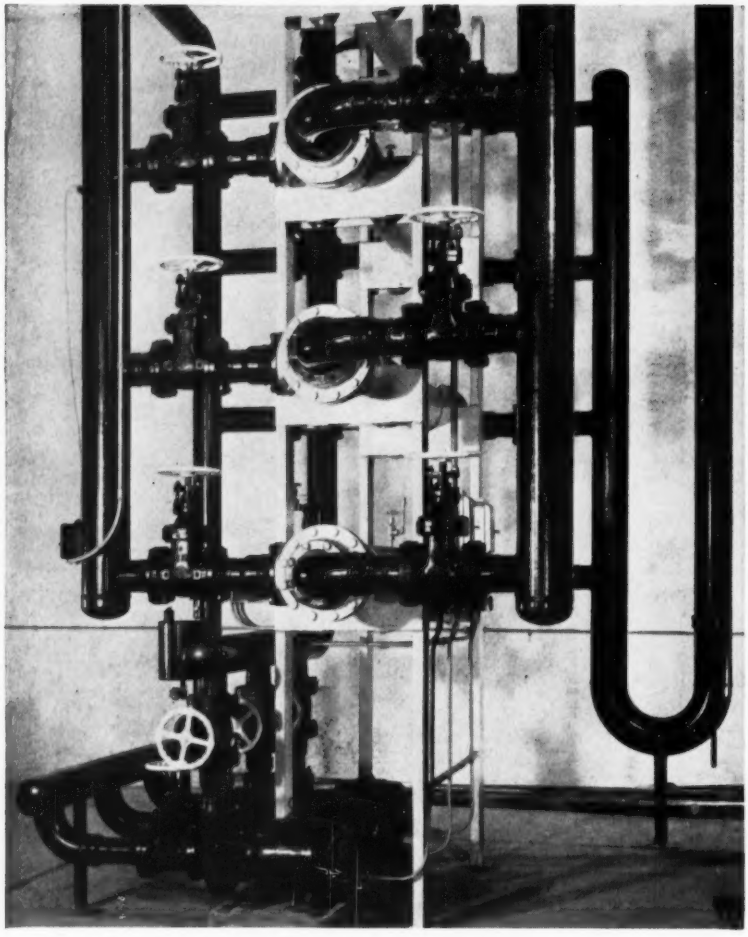
DOORS MOUNT ON STRUCTURE—prevent accidental contact with energized bus when starter unit is removed.

Nothing has been left to chance in the design of this control center. Structure, starters, and protective devices have all been carefully engineered, manufactured and coordinated by Federal Pacific to assure the highest standard of operating efficiency and dependability—as well as to provide unified responsibility for performance. For complete details write for Bulletin 2-2000A, Federal Pacific Electric Company, General Offices: Dept. 305, Newark 1, New Jersey.

FPE

FEDERAL PACIFIC ELECTRIC COMPANY

The Best in Electrical Distribution and Control Equipment.



This big Texas warehouse depends on WEINMAN UNIPUMPS

. . . so can you!

In this Texas-size refrigerated warehouse, one of the largest in the southwest, Weinman Unipumps deliver continuous, efficient service with minimum maintenance.

You can't buy more dependable, more versatile performers than Weinman Unipumps. There are a broad variety of sizes to suit every general service need. All are easily mounted horizontally or vertically—operate efficiently in any position on walls or floors.

You'll save valuable space, too. Compact Weinman Unipumps need far less room than you would guess. Your choice of horsepower ratings from ½ to 50 hp . . . either enclosed or open type impellers . . . capacities to 1700 gpm, with heads to 260 ft.

It will pay you to talk over your general service pump needs with a Weinman pump specialist. He's listed in the Yellow Pages of your telephone directory. For more information about adaptable Weinman Unipumps, write for your free copy of Bulletin No. 300, today.

THE WEINMAN PUMP MFG CO.
290 SPRUCE ST. COLUMBUS 8, OHIO

CENTRIFUGAL SPECIALISTS

(civil, struc., mech., elec.) $450,000. Client, District Public Works Officer, Great Lakes, Illinois.

¶ Shell housing improvement program, Lowry Air Force Base, Colorado. (civil, struc., mech., elec.) $225,000. Client, Base engineer, Lowry Air Force Base, Colorado.

¶ 16-story apartment building, Denver, Colo. (struc.) $1,250,000 Client, Robert A. Hiester, Architect.

¶ Alterations and improvements to Petersen Air Force Base, Colorado. (civil, struc., mech., elec.) $100,000. Client, Base engineer, Ent Air Force Base, Colo.

¶ Water system study, Strasburg, Colo. (civil) $150,000. Client, Town of Strasburg, Colo.

Olsson & Burroughs
Lincoln, Nebraska

¶ Empire Electric (REA), Cortez, Colorado. (civil, struc.) $175,000. Client, Keith Mauck, Architect.

Paul H. Koch
Denver, Colorado

¶ Remodel Shirley-Savoy Hotel, Denver, Colorado. (mech.) $463,000. Client, Shirley-Savoy Hotel.

Laffoon & Woolford
Pueblo, Colorado

¶ Comprehensive analysis and plan of City of Florence, Colorado to include land use, traffic, and zoning. (civil) Client, City of Florence, Colorado.

DISTRICT OF COLUMBIA

General Engineering Associates
Washington, D.C.

¶ Air condition apartment building, 110 units, Washington, D.C. (mech., elec.) $1.2 million. Client, Corning & Moore, Architects.

¶ Thirteen-story office building, Washington, D.C. (mech., elec.) $3.5 million. Client, Cafritz Construction Company, builders.

¶ Thirteen-story office building, Washington, D.C. (mech., elec.) $3 million. Client, Cafritz Construction Company, builders.

¶ Thirteen-story office building, Washington, D.C. (mech., elec.) $2.5 million. Client, Vlastimil Koubek, Architect.

FLORIDA

Evans & Associates
Cleveland, Ohio

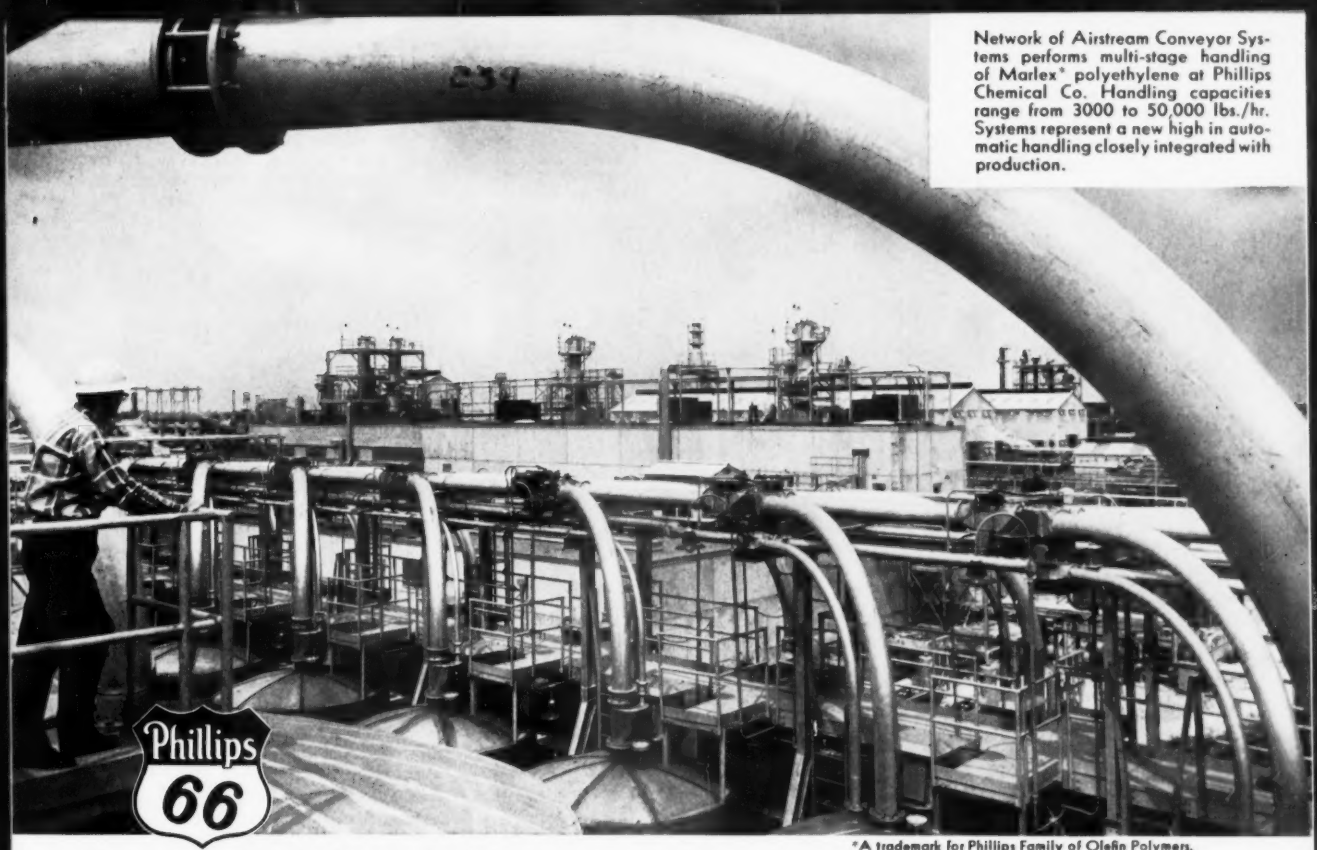
¶ St. Augustine rectory, St. Augustine, Florida. (mech.) $20,000. Client, arch.

Black and Associates, Inc.
Gainesville, Florida

¶ Water and sewerage improvements, Boca Raton, Fla. (civil, struc., mech., elec.) $900,000. Client, City of Boca Raton, Florida.

¶ Water works improvements, Naples, Fla. (civil, struc., mech., elec.) $450,000. Client, City of Naples.

¶ Water works improvements, Orlando, Fla. (civil, struc., mech., elec.) $875,000.



Network of Airstream Conveyor Systems performs multi-stage handling of Marlex* polyethylene at Phillips Chemical Co. Handling capacities range from 3000 to 50,000 lbs./hr. Systems represent a new high in automatic handling closely integrated with production.

*A trademark for Phillips Family of Olefin Polymers.

At new polyethylene plant . . .

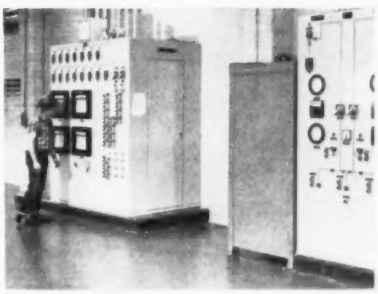
Phillips uses *Airstream* Conveyors for bulk materials handling

Phillips Chemical Co. uses Dracco Airstream Conveyors for bulk handling of polyethylene at its Pasadena (Texas) plant. Three main conveyor systems, consisting of a dozen subsystems, total 10,500 feet in length. These provide high-volume, high-purity handling demanded by Phillips' advanced processes.

All systems are closely integrated with production from the time polyethylene becomes a dry bulk material until it is shipped to plastics processors. Handling is contamination-free. Controlled atmosphere conveying techniques, with inert gas as the conveying medium, are used as required. Centralized, automatic control is extensively employed.

The Dracco systems at Phillips exemplify the future potential of pneumatic conveying in meeting industry's needs for handling dry materials in bulk throughout production. Design and fabrication required a comprehensive "systems approach" to air conveying, incorporating intimate knowledge of instrumentation, production processes, continuous flow principles, construction materials and bulk material characteristics.

For this approach to your handling problem, contact Dracco today.



Typical conveyor system control panels at Phillips. All systems are completely interlocked to block out control equipment on other panels which may conflict with a given conveying operation.

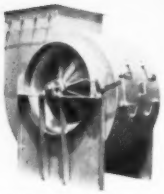
Pneumatic handling starts at dryers. Closed-circuit system uses inert gas to convey "fluff" polyethylene to processing building.

DRACCO DIVISION OF FULLER CO.

4030 East 116th Street • Cleveland 5, Ohio

DRACCO *airstream* conveyors
dust control equipment

WHIRLEX
Shop Assembled
DUST COLLECTORS . . .



WHIRLEX FORCED DRAFT FANS are designed for heavy duty service in all types of boiler applications. Airfoil bladed impeller provides maximum static efficiency.

- - - Eliminate Costly Field Assembly

Whirlex dust collectors are designed to provide maximum collection efficiency for each specific type of application. The unit is then fabricated and completely shop assembled and need only be set in place and the hoppers bolted on at the installation site. Each Whirlex unit is rigidly inspected before it leaves the shop, assuring a completely "gas-tight" installation.

More specific information is available upon request.

Fly Ash Arrestor
CORPORATION
203 North First Street • Birmingham, Alabama

Dust Collectors • Induced Draft Fans
Forced Draft Fans • Exhaust Fans
Self Supporting Stacks • Duct Work

FLY ASH WHIRLEX ARRESTOR

Client, the Orlando Utilities Commission.
¶ Water main extensions, Pinellas County, Fla. (civil, mech.) $2 million. Client, Pinellas County Water System.
¶ Sewerage improvements, Titusville, Fla. (civil, struc., mech., elec.) $500,000. Client, City of Titusville, Fla.

IDAHO

Cornell, Howland, Hayes & Merryfield
Boise, Idaho
¶ Design of sanitary sewer system to serve approximately 4000 acres and 20,000 population adjacent to and including portions of Boise, including approximately 97 miles of sewers. (civil, struc., mech., elec.) $4 million. Client, Boise Bench Sewer District, Boise, Idaho.

ILLINOIS

Sessions Engineering Company
Chicago, Illinois
¶ Office and factory air conditioning. (struc., mech., elec.) $500,000 (est.). Client, Powers Regulator Co., Skokie, Ill.

INDIANA

Hazelet & Erdal
Louisville, Kentucky
¶ Design and preparation of contract plans for six-lane highway bridge to carry IR-64 over Ohio River between Louisville, Kentucky and New Albany, Indiana. (civil, struc.) $15 million. Client, States of Indiana and Kentucky.
¶ Highway, 5.6-mile section of IR-65 south of Columbus, Indiana, including preparation of roadway plans, right-of-way plats, design, survey, and borings for structures including bridge over White River. (civil, struc.) $5 million. Client, State of Indiana.

KANSAS

Guy M. Shelley & Company
Wichita, Kansas
¶ Refinery improvements including storage and crude facilities, gasoline blending and asphalt blending facilities, fire protection system. (struc., mech., elec.) $300,000 (est.). Client, Century Refining Co., Garden City, Kansas.

LOUISIANA

Roessle and Galloway
Metairie, Louisiana
¶ Street paving and drainage. $1,350,000. Client, Jefferson Parish, State of Louisiana.

Brown & Butler
Baton Rouge, Louisiana
¶ Expansion of sanitary sewer system including new gravity lines, new lift stations, modifications to existing lift stations, Morgan City, Louisiana. (civil, struc., mech., elec.) $300,000. Client, City of Morgan City, La.
¶ Design of streets and utilities including sewage treatment plant for 124-unit subdivision, St. Francisville, Louisiana.

TO MARK PROGRESS

LADISH

Controlled Quality

LIGHT WEIGHT WELDING FITTINGS

developed for economical, dependable low pressure piping systems

LOWER COST

Substantial savings realized in purchase price of fittings and pipe.

REDUCED WEIGHT

Important weight reductions achieved by reducing wall thickness to correspond with service requirements.

GREATER FLOW

Larger inside diameter provides increased flow capacity.

EASE OF INSTALLATION

Reduced weight facilitates handling . . . speeds installation.

AVAILABILITY

Stocked in sizes 4" through 24". Wall thicknesses range from .188" to .250".

CONFORMITY TO SPECIFICATIONS

These fittings meet all requirements of ASA Code for Pressure Piping B31.1 —1955 and B31.1.8 —1955, ASTM A234 and ASA B16.9.

Lower purchase cost . . . reduction in weight . . . economy and ease in installation . . . increase in flow capacity—these are multiple advantages gained in using Ladish Light Weight Seamless Welding Fittings.

These Light Weight Fittings have been developed and produced under rigid metallurgical and manufacturing standards as part of a continuing program to meet the specific needs of industry for economical, functionally designed fittings.

Specification sheets on Light Weight Welding Fittings and Flanges available on request.

TO MARK PROGRESS

LADISH CO.

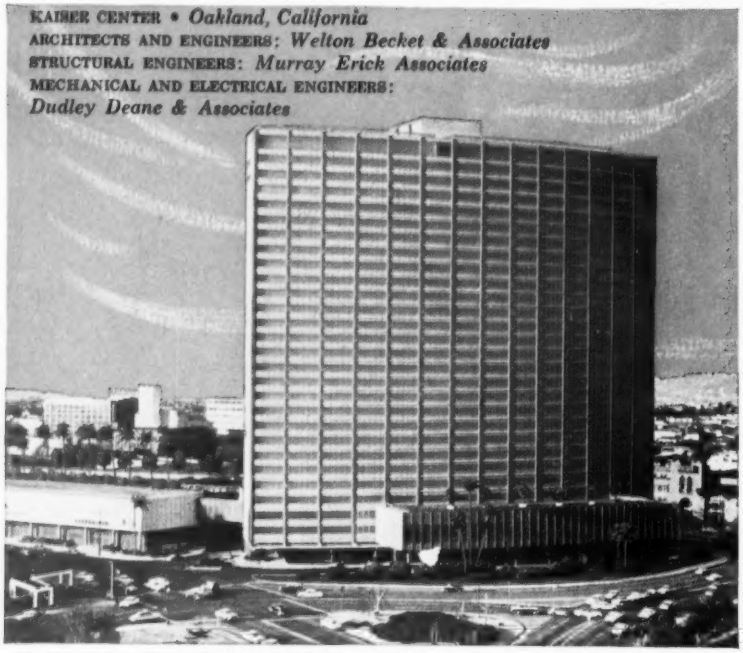
CUDAHY (Milwaukee Suburb) WISCONSIN

SALES OFFICES: Amarillo • Atlanta • Baton Rouge • Buffalo • Calgary Chicago • Cincinnati • Cleveland • Denver • Havana • Houston • Los Angeles Mexico City • Montreal • New York • Odessa • Philadelphia • Pittsburgh St. Louis • St. Paul • San Diego • San Francisco • Seattle • Toronto • Tulsa

SAW BLADES • PIPE FITTINGS • DROP FORGINGS • RINGS • VALVES

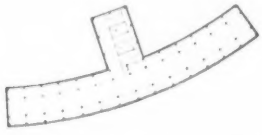
LADISH...THE FITTINGS LINE THAT OFFERS COMPLETE SERVICE IN TYPES, SIZES AND MATERIAL SPECIFICATIONS

WELDING FITTINGS	ASA & MSS FLANGES	SCREWED & SOCKET FITTINGS & UNIONS	LONG NECKS	LARGE DIAMETER & T.E.M.A. FLANGES


KAISER CENTER • Oakland, California
ARCHITECTS AND ENGINEERS: Welton Becket & Associates
STRUCTURAL ENGINEERS: Murray Erick Associates
MECHANICAL AND ELECTRICAL ENGINEERS:
Dudley Deane & Associates

Floor areas electrified in the West's largest office building

Milcor Celluflor anticipates tomorrow's electrical load in new Kaiser Center

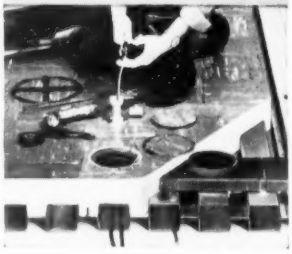


Here, to provide unlimited electrification at low cost — and meet the challenging construction requirements of a fan-shaped floor layout — the architect has combined four types of Milcor Celluflor panels.

The underfloor cells serve as raceways to handle the complex cable systems required by communications systems and electronic office equipment in this 28-story building. And—there's electrical capacity to spare!

There are other advantages of Celluflor — savings of steel, footings, and construction time. See Sweet's Architectural File, section 2a/In — or write for catalog 270.

Electrical header duct carries feeder circuits across Celluflor cells. In a few minutes, new outlets can be installed only inches from any location on the floor.



MILCOR® Celluflor

INLAND STEEL PRODUCTS COMPANY Member of the Steel Family
DEPT. B-4149 WEST BURNHAM STREET, MILWAUKEE 1, WISCONSIN
ATLANTA, BALTIMORE, BUFFALO, CHICAGO, CINCINNATI, CLEVELAND, DALLAS, DENVER, DETROIT, KANSAS CITY, LOS ANGELES, MILWAUKEE, NEW ORLEANS, NEW YORK, ST. LOUIS, ST. PAUL.
C-16

(civil, struc., mech., elec.) $300,000. Client, Audubon Improvement Co., Inc.
¶ Sewage treatment plant including complete sludge oxidation, Port Allen, Louisiana. (civil, struc., mech., elec.) $350,000. Client, Town of Port Allen, La.

J. J. Krebs & Sons
New Orleans, Louisiana
¶ Off-site improvements including streets, drainage, sanitary sewers, and water distribution for units 2 and 3 of Carolyn Park subdivision, New Orleans, La. (civil) $1 million. Client, Carolyn Park, Inc.
¶ Off-site improvements including streets, drainage, sanitary sewers, and water distribution for Arbor Lane subdivision, New Orleans, La. (civil) $25,000. Client, Roy O. Allen.

Irving B. Rau
New Orleans, Louisiana
¶ Warehouse for special metals, 40,000 sq ft, New Orleans, La. (civil, struc.) Client, Glazer Steel Corp., New Orleans.
¶ Bethany Baptist Church, New Orleans. (struc.) Client, Stoffle & Finger, Arch.
¶ Fire station, New Orleans, La. (struc.) $85,000. Client, Nolan, Norman & Nolan, Architects.

MARYLAND

General Engineering Associates
Washington, D.C.
¶ Department store, 162,000 sq ft, Wheaton Plaza shopping center, Wheaton, Maryland. (mech., elec.) $2 million. Client, Arthur L. Anderson, Architect.
¶ 90-unit apartment building, Baltimore, Maryland. (mech., elec.) $1,750,000. Client, Leavitt Associates, Architects.

MASSACHUSETTS

Bogert & Childs
New York, New York
¶ Plans and specifications for additions to Provin Mountain reservoir. (civil, struc., mech., elec.) $3 million. Client, City of Springfield, Massachusetts.

MICHIGAN

Lanterman Associates
Ann Arbor, Michigan
¶ Subdivisions, Ann Arbor, Michigan. (civil) $300,000. Client, Vernon Dev. Rouge Building Co., Roberts-Brown.
¶ Subdivisions, Northville, Michigan. (civil) $250,000. Client, K & G Construction Co., D & R Building Co.
¶ Design Huron River dam and channel improvements. (civil) $250,000. Client, Counties of Livingston and Washtenaw.
¶ Municipal improvements. (civil) $100,000. Client, Cities of Brighton and Ann Arbor, Michigan.

MINNESOTA

Foss & Company
Moorhead, Minnesota
¶ Water treatment plant, Moorhead, Minn. (civil, struc., mech., elec.) $1.5 million. Client, the City of Moorhead, Minnesota.

CAN THIS EXTRA "BUFFALO" SERVICE SAVE YOU TIME?

"Buffalo" Engineering Representatives are not "ivory tower experts": they're working engineers like you. They'll gladly help you select the proper air handling components for the quality heating, ventilating and air conditioning systems you design. These men talk your language: their regular work brings them into close daily contact with consulting engineers.

You, of course, are the "boss". You're intimately familiar with the broad, overall design aspects of your clients' projects. But when it comes to specialized problems related to air moving, it may well be to your advantage to call in your nearby "Buffalo" Representative. Like all members of the "Buffalo" engineering team, he is a highly-trained specialist in his field.

"Buffalo" Representatives are graduate engineers, carefully selected from top bracket applicants. Their fan engineering and air moving training at the "Buffalo" home office is rigorous and thorough — including months spent in coveralls with experienced engineers right in the plant. When ready for the field, they are expertly capable of solving practically every air moving problem they will encounter. Backing them up is the combined total experience of the home office engineering staff, with files covering almost every conceivable type of application.

Your "Buffalo" Representative can match equipment to your requirements — exactly — often pointing the way to worthwhile savings (both initial and long-range) that will please both you and your clients. You know the quality of the products he represents: the 82-year-old "Buffalo" reputation for building the finest equipment.

Whatever your air moving problem, call your "Buffalo" Engineering Representative. He's as near as your phone, and will be glad to put his specialized know-how and experience to work to help you in every way possible.

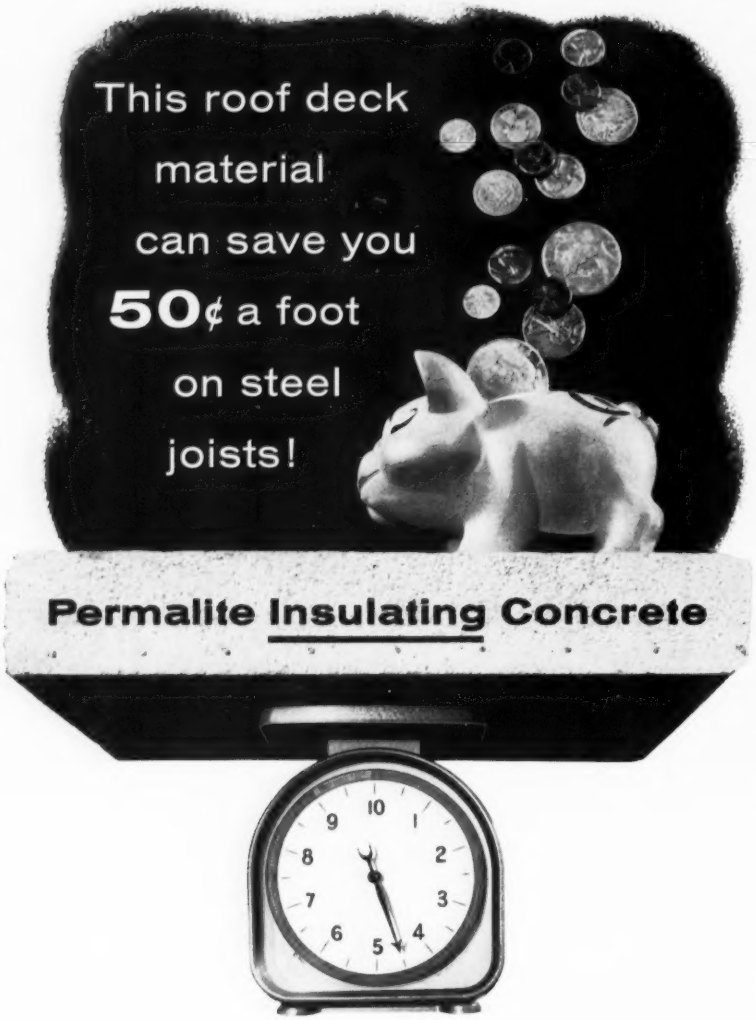
"Buffalo"

BUFFALO FORGE COMPANY

BUFFALO, N. Y.

Buffalo Pumps Division, Buffalo, N. Y. • Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING • AIR CLEANING • AIR TEMPERING • INDUCED DRAFT • EXHAUSTING • FORCED DRAFT • COOLING • HEATING • PRESSURE BLOWING



Permalite insulating concrete (1:6 mix Portland cement and Permalite expanded perlite aggregate), 2" thick, weighs only 4½ lbs./sq. ft.—about 4 lbs. less than other commonly-used poured-in-place roof deck materials.

With such light weight you can usually specify a size smaller joist, weighing 2 lbs. less per lineal foot... 50¢ a foot saving, with a steel-in-place cost of 25¢ lb. And you have more than adequate compressive strength—180 psi.

As for insulation, 1:6 mix Permalite concrete has a "k" of 0.58, and a "U" value of about .20 for a 2" thickness with built-up roof over permanent forms such as corrugated steel and paper-backed wire mesh.

Other advantages: Firesafe. Can't rot. Vermin-proof; termite-proof. Handles and places like any ordinary concrete. Easily sloped to drain.

No other roof deck material gives you so much insulation, with so much strength, at such light weight!

See your Sweets File, or write for complete information

Permalite® | THE LARGEST SELLING PERLITE AGGREGATE IN THE WORLD

Perlite Department, Great Lakes Carbon Corp., 612 S. Flower St., Los Angeles 17, Calif.

Permalite aggregate is produced by licensed franchisees from perlite ore mined by Great Lakes Carbon Corporation.

MISSISSIPPI

Lester Engineering Company
Jackson, Mississippi
¶ Culkin water distribution system, Vicksburg, Mississippi. (civil) $210,000. Client, Culkin Water District.
¶ Sanitary sewage collection and disposal, Florence, Mississippi. (civil) $60,000. Client, Town of Florence, Miss.
¶ Water and sewer study, Walnut Grove, Mississippi. (civil) Client, Town of Walnut Grove, Miss.
¶ Sewage collection and disposal study, Hanging Moss Creek basin, Jackson, Mississippi. (civil) Client, City of Jackson, Miss.

Brown & Butler
Baton Rouge, Louisiana
¶ Natchez, Mississippi port terminal facilities on Mississippi River, including dock structure, open and covered storage, trackage, attendant earthwork. (Joint venture with Jordan, Kaiser & Sessions, Natchez, Miss.) (civil, struc., mech., elec.) $1 million. Client, Natchez-Adams County Port Commission.

NEBRASKA

Olsson & Burroughs
Lincoln, Nebraska
¶ Mickle junior high school, Lincoln, Nebraska. (civil, struc.) $1.2 million. Client, Unthank & Unthank, Architects.
¶ Callaway high school, Callaway, Nebraska. (struc.) $250,000. Client, Helleberg & Helleberg, Architects.
¶ Holy Trinity Episcopal Church, Lincoln, Nebraska. (civil, struc.) $480,000. Client, Unthank & Unthank, Architects.
¶ Waterworks improvements, Ord, Nebraska. (civil) $65,000. Client, City of Ord, Nebraska.
¶ Sewage treatment plant improvements, David City, Nebraska. (civil) $90,000. Client, David City, Nebraska.
¶ Curb and gutter improvements, Hickman, Nebraska. (civil) $22,000. Client, Village of Hickman, Nebraska.

NEVADA

Charles O. Greenwood, Jr.
¶ Road design, Las Vegas, Nevada. (civil) $150,000. Client, Fiberboard Paper Products Corporation.

NEW JERSEY

Bogert & Childs
New York, New York
¶ Plans and specifications for sewerage system and sewage treatment plant. (civil, struc., mech., elec.) $3 million. Client, Township of Lower Penns Neck, New Jersey.

Henry J. Campbell, Jr.
Mineola, New York
¶ Deshler residence, Bernardsville, New Jersey. (mech., elec.) $250,000. Client, Henry Titus Aspinwall, Architect.
¶ Continental Restaurant, Monmouth, New Jersey, new branch of restaurant

SAVED!

by KRAMER

THERMOBANK COMPRESSOR

your *money!* Kramer's THERMOBANK COMPRESSOR costs less — even less than most so-called "cheap" defrost systems. Many extra components are installed in this package unit, including compressor starter switch, evaporator motor switch, strainer, drier, high and low pressure switches, control box, magnetic starters, sight glass, purge valve, suction vibration eliminator and all service valves.

your *time!* Time saved is money saved. Factory assembled and run-in, THERMOBANK COMPRESSOR is ready to operate. It requires simplest connections between evaporator and compressor package, saving costly installation time. Start-up, control adjustments, and servicing are much easier. Expensive call-backs are eliminated.

your *space!* Uniquely designed, THERMOBANK COMPRESSOR is the only system where the high-side can be installed outdoors; it works in any location in the United States at any time of the year.

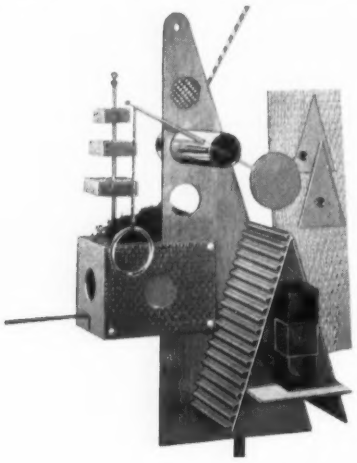
THERMOBANK COMPRESSOR FOR OUTDOOR USE

WRITE FOR BULLETIN TC-406

KRAMER TRENTON CO. Trenton 5, N. J.

45 YEARS OF CONTINUOUS ACHIEVEMENT IN HEAT TRANSFER

Consultants Data File . . . one of an interminable series



AIR-CONDITIONED BIRD SANCTUARY FOR MISSISSIPPI WARBLERS

a unique solution to an age-old electrical problem

To keep Mississippi Warblers happy as larks despite ambient temperature variations, Consultant Robin Hawkes designed a special circuit arrangement strictly for the birds. The imaginative building features hi-fi cat's paw recordings for the combat training of baby warblers, a complete electric kitchen for the preparation of tasty egg dishes and a well-lighted library which includes, of course, the prints of John James Autobahn.

As circuit protection for this electric house of wonders, Mr. Hawkes chose Heinemann Hydraulic-Magnetic Circuit Breakers. Among the reasons for Consultant Hawkes' choice: temperature-stable current ratings and must-trip points, one-time installation (nothing to replace), simplicity of operation (no re-set procedure, no thermal elements, no waiting for restoration of service). "Why," says Hawkes, "with Heinemann Circuit Breakers, even a bird-brained warbler can feather his nest in complete safety and comfort."

Now in its eleven thousandth printing . . . Heinemann's informative booklet called, "What You Should Know About Circuit Breakers." There's a copy waiting for you in our over-stocked mailroom. To get one, all you have to do is ask for Manual 101.

S. A. 1419

HEINEMANN

HEINEMANN ELECTRIC COMPANY
127 Plum Street, Trenton 2, N. J.

Circuit breakers

chain. (mech., elec.) $400,000. Client, Morris Lapidus, Kornblath, Harle & O'Mara, Architects.

NEW MEXICO

W. F. Turney & Associates
Santa Fe, New Mexico
¶ New airport and terminal building, Alamogordo, New Mexico. (civil, elec.) $600,000. Client, City of Alamogordo.
¶ Street paving, Belen, New Mexico. (civil) $350,000. Client, Town of Belen, New Mexico.
¶ Sewage treatment plant and outfall sewer (planning stage only), Albuquerque, New Mexico. (civil) $2 million. Client, City of Albuquerque, N. M.
¶ Alert facilities for air force base, New Mexico. (civil, elec.) $1,148,000. Client, Albuquerque District, USED.
¶ Water transmission line. (civil) $400,000. Client, Alamogordo, N. M.

NEW YORK

McNamee, Porter & Seeley
Ann Arbor, Michigan
¶ Incinerator building to house equipment already purchased. $125,000. Client, City of North Tonawanda, New York.

Gennaro Mianulli
Brooklyn, New York
¶ St. Leo Roman Catholic church, Corona, Long Island. (struc.) $60,000. Client, Diocesan Building Office, Brooklyn.
¶ Reinforced concrete wall, Coney Island, New York. (civil, struc.) $30,000. Client, Rev. John Walker, Catholic Youth Organization, Brooklyn.

P. Anthony Sarubbi, P.E.
Yonkers, New York
¶ Plant road and ramp with retaining walls, loading dock, and drainage. (civil, struc.) $40,000. Client, Manufacturers Center of Yonkers, Inc.
¶ Plant renovation, including new toilet facilities, fire walls, fire doors, and partitions. (struc., mech., arch.) $10,000. Client, Manufacturers Center of Yonkers.

Henry J. Campbell, Jr.
Mineola, New York
¶ Rosemary Convent, Huntington, New York. Installation of water supply, fire protection, and sprinkler system. (mech.) $25,000. Client, Roman Catholic Diocese of Rockville Centre.
¶ First National Bank of East Islip, new main banking office. (mech., elec.) $350,000. Client, Eugene S. Helbig, Architect.

OHIO

Evans & Associates
Cleveland, Ohio
¶ Motel, Lorain, Ohio. (mech.) $60,000. Client, architect.
¶ Little Sisters of the Poor, Cleveland, Ohio. (mech.) $320,000. Client, arch.
¶ St. James A.M.E. Church, Cleveland, Ohio. (mech.) $25,000. Client, architect.
¶ Two Parma elementary schools, Parma, Ohio. (mech.) $200,000. Client, architect.

BUTTERFLY VALVE FACT FILE

Where to use Butterfly Valves

The field of use for rubber seat butterfly valves is broad, comprising the handling of large volumes of liquid or gas at pressures up to 125 psi. and at temperatures from —20°F to 190°F. Within this area, inherent simplicity of form and function in the butterfly valve give it great advantages over other types of valves.

Henry Pratt butterfly valves are light in weight, compact and mechanically simple, factors that greatly reduce the kind of installation and maintenance costs that can be shockingly expensive in valves weighing a ton or more.

As you can see below, the great advantages inherent in butterfly valves have been multiplied, through Henry Pratt engineering, into a wide variety of practical, economical valving for standard operations as well as unusual problems in power and water works systems.

LOW PRESSURE valves are widely used in water works, power stations and industry where pressures range from vacuum to 50 psi. Pratt has built valves as large as 14 feet in diameter for wind tunnel use, and, for air circulation in nuclear power plants, valves that slam shut in 3/10 of a second.

COMBINATION VALVE AND EXPANSION JOINT combines two functions in one unit. This is economical both in material and installation costs because it eliminates one set of flanges and bolts. Units are built with rubber or steel bellows expansion joints.

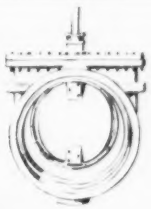
HIGH PRESSURE valves are excellent for pump discharge-check applications and water distribution service. These valves have an upper pressure limit of 125 psi and velocity capability as high as 55 feet per second.

SPECIAL END VALVING. In some installations, such as water main service, flanged connections are not necessary, so both High and Low Pressure Pratt Valves are built with end modifications for bell-and-spigot piping and couplings such as Dresser or Victaulic.

ENDS OF PIPELINES or conduits. Single flange valves can be bolted directly to the end of a pipeline, conduit, settling basin wall or face of a reservoir. Functioning as sluice gates, they have the added advantages of permanent drop-tight shut-off with no need for adjustment or maintenance.

EXTRA LENGTH VALVING. Butterfly valves are often used for economical replacement of other valve types. As Pratt valves are relatively narrow, the laying length is increased by using a wider valve body or adding a spool piece.

LIMITED SPACE. Developed by the Henry Pratt Company, the Ob-Round valve makes it possible to obtain a desired valve area where space limitations prevent the use of a round valve. Ideal for basin or conduit applications.



INSERT VALVING. An original Pratt development that simplifies the replacement of gate valves by butterfly valves. The entire butterfly valve fits inside the gate valve body, saving the cost of removing valve body from the line.

If you would like to know all about Henry Pratt valves, write for our Manual of Rubber Seat Butterfly Valves B-2.

HENRY PRATT

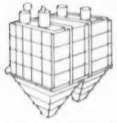
RUBBER SEAT Butterfly Valves

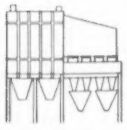
HENRY PRATT COMPANY, 2222 S. HALSTED ST., CHICAGO 8, ILL. • REPRESENTATIVES IN PRINCIPAL CITIES

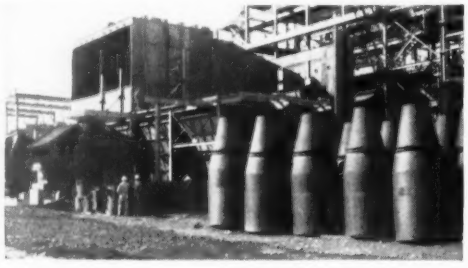
The most efficient operating cyclone collectors made

Design makes the difference: in over a thousand plants across the continent, Buell Cyclones have *proved* themselves more efficient than any other cyclones made. Buell's exclusive Shave-off port (A), traps the extra percentage of dust that ordinary cyclones lose. And large-diameter (B), custom-engineered design eliminates bridging, clogging, or plugging during operation, keeps efficiency high without interruption. Regardless of your present or planned plant layout, Buell equipment can be designed to solve your dust collection problems efficiently and economically. There's valuable information in a concise booklet, "The Exclusive Buell Cyclone". Write Dept. 47-B, Buell Engineering Company, Inc., 123 William Street, New York 38, N. Y.

BUELL CYCLONES


"SF" ELECTRIC PRECIPITATORS


PRECIPITATOR-CYCLONE COMBINATIONS


Buell Cyclones before installation at a major plant.

buell®

Experts at delivering Extra Efficiency in

DUST COLLECTION SYSTEMS

¶ Motel, Parma, Ohio. (mech.) $30,000. Client, architect.
¶ Copley elementary school, Copley, Ohio. (mech.) $60,000. Client, architect.
¶ Church Hill Methodist Church addition, Youngstown, Ohio. (mech.) $15,000. Client, architect.
¶ International Molded Plastics building addition, Cleveland, Ohio. (mech.) $30,000. Client, architect.
¶ St. Stephens Church, Cleveland, Ohio. (mech.) $25,000. Client, architect.

H. G. Dill Company
Columbus, Ohio
¶ East 5th Avenue grade crossing elimination, Columbus, Ohio. (civil, struc.) $1.5 million. Client, City of Columbus, Ohio.
¶ Complete municipal waterworks system, Enon, Ohio. (civil) $400,000. Client, Village of Enon, Ohio.
¶ 417-lot residential subdivision, Columbus, Ohio. (civil) Client, Metzger Bros.
¶ 700-lot residential subdivision, Columbus, Ohio. (civil) Client, William H. Davis.
¶ 370-lot residential subdivision, Columbus, Ohio. (civil) Client, Chipley Realty & Development Company.
¶ 700-lot residential subdivision, Hillards, Ohio. (civil) Client, McFadden Dev.

George M. Neuffer
Dayton, Ohio
¶ Bowling alley, Wilmington, Ohio. (civil, struc.) $250,000.
¶ Supermarket, Dayton, Ohio. (civil, struc.) $200,000.
¶ Warehouse, Dayton, Ohio. (civil, struc.) $125,000.
¶ Warehouse, Dayton, Ohio. (civil, struc.) $150,000.

Roderick O'Donoghue & Company
New York, New York
¶ Paper mill improvements. (civil, struc., mech., elec.) $2.5 million. Client, Fox Paper Co., Lockland, Ohio.

Markey and Hasselbring
Lebanon, Ohio
¶ Detail plans for sewers and sewage treatment. (civil) $1.6 million. Client, Village of Mason, Ohio.
¶ Underground and surface improvements, Governors Hill Development. (civil) $300,000. Client, Paul Welch Development Corp., Dayton, Ohio.

OKLAHOMA

John C. Penafeather
Tulsa, Oklahoma
¶ Air conditioning for 4-story nurses' residence, St. Johns Hospital, Tulsa, Okla. (mech., elec.) $250,000. Client, Leon B. Senter, Architect for Sisters of the Sorrowful Mother.

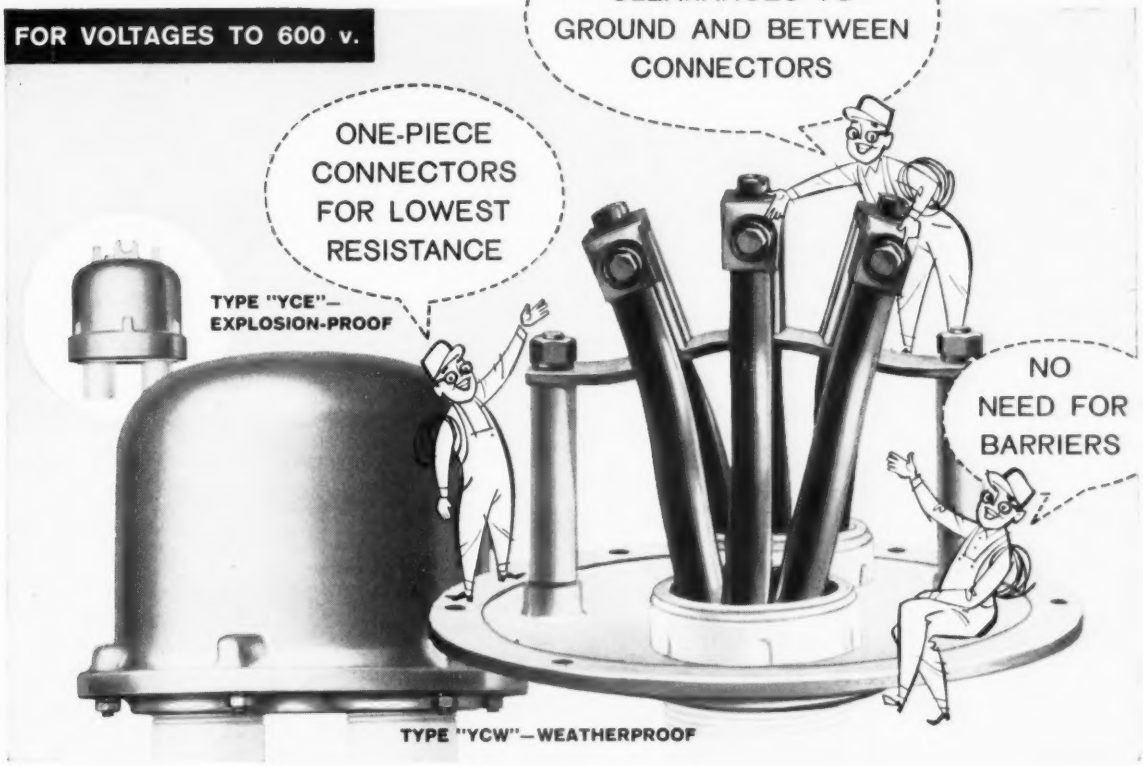
OREGON

Cornell, Howland, Hayes & Merryfield
Corvallis, Oregon
¶ Design mill race pumping station to provide flow of water for existing Eu-

NEW! O.Z. PULL-N-SPLICE BOXES!
CONVENIENT · COMPACT · ECONOMICAL

Exclusive moisture-, fungus-, corrosion-resistant features!

FOR VOLTAGES TO 600 v.


GREATER CLEARANCES TO GROUND AND BETWEEN CONNECTORS
ONE-PIECE CONNECTORS FOR LOWEST RESISTANCE
TYPE "YCE"— EXPLOSION-PROOF
NO NEED FOR BARRIERS
TYPE "YCW"—WEATHERPROOF

O.Z. Pull-n-Splice Boxes mark a significant advance in pull box construction!

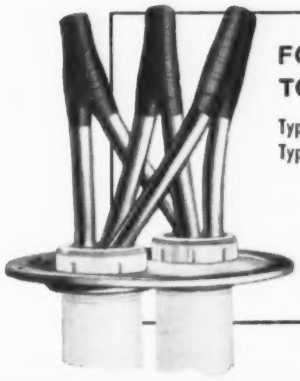
Their highly compact size saves *more space than ever!*

Their more efficient design means *new savings in installation time and labor!*

Their moisture-, fungus-, and corrosion-resistant features mean long, trouble-free service.

Still, with all their features, the new O.Z. Pull-n-Splice Boxes are *smaller* — and *cost far less* than conventional pull boxes . . . even late model *competitive* types! And, you get a bonus in high quality materials and workmanship so characteristic of *all* O.Z. products!

For complete information on these and the many other O.Z. products that mean more for you, call your local O.Z. distributor, or write to the company.



FOR VOLTAGES TO 5000 v.

Type "YPW" — Weatherproof
Type "YPE" — Explosion-proof

Deeper dome than "YCW" and "YCE". Furnished without connector panels. Insulated pigtail splices recommended.

O.Z. ELECTRICAL MANUFACTURING CO., INC.
262 BOND STREET · BROOKLYN 17, N. Y.

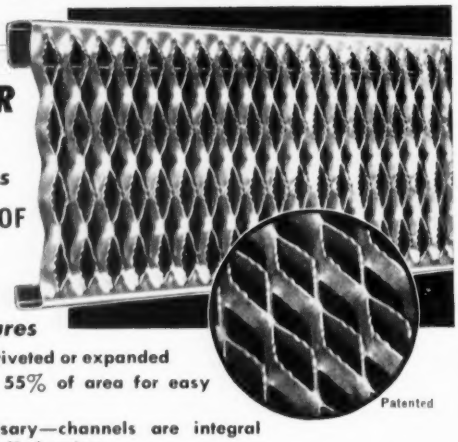
- CAST IRON BOXES
- CABLE TERMINATORS
- POWER CONNECTORS
- SOLDERLESS CONNECTORS
- GROUNDING DEVICES
- CONDUIT FITTINGS
- INTERLOCKED ARMOR CABLE FITTINGS

Sales Office and Warehouse: 406 So. Cicero Avenue, Chicago 44, Ill. • ESterbrook 9-0326
Office and Factory: 749 Bryant Street, San Francisco 7, Calif. • GArfield 1-7846

two superior open steel
FLOOR GRATINGS
BY GLOBE

1 *Safety* **GRIP-STRUT®**

FOR MAXIMUM SAFETY ALL OVER YOUR PLANT



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★ FIRE PROOF ★ SLIP PROOF
★ MAXIMUM STRENGTH
★ MINIMUM WEIGHT

Important Economy Features

★ All one piece, not welded, riveted or expanded
★ Open space in excess of 55% of area for easy access of light and air
★ No extra supports necessary—channels are integral part of the material. ★ Self cleaning
★ Cut and installed like lumber by your own maintenance force. ★ Low in original cost. ★ For balconies, no secondary sprinkler heads needed

Ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads.

2 **GOLD NUGGET® WELDED *grating***
PAT. PENDING

The QUALITY GRATING for Heavy Duty Applications

★ 3/16" projection weld nugget for greater rigidity and strength
★ Vertical alignment of the main load bar assured
★ All bars are load carrying bars including secondary bars
★ Anti-skid pattern

PROJECTION WELD

Each secondary load bar (A), as projected welded to the primary load bar (B) has a shear strength of 5,000 pounds per weld. There are 28 such projection welds to a square foot of grating. This means that GOLD NUGGET Welded Grating can sustain greater shock loads than other gratings.

For the complete details of these revolutionary new gratings, write for new catalogs today. Distributors in all principal cities. Consult the yellow pages in your phone book under "GRATING".

108

PRODUCTS DIVISION
The **GLOBE** *Company* MANUFACTURERS SINCE 1914
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gene mill race; water to be used to furnish cooling water for university heating plant, Eugene, Oregon. (civil, mech., elec.) $40,000. Client, City of Eugene, Oregon and University of Oregon.

¶ Design IBM district sales office, Salem, Oregon. Single story structure with partial basement and provision for a second story, completely air conditioned. (civil, struc., mech., elec.) $143,000. Client, J. L. Payne, Architect.

¶ Engineering study of complete storm and sanitary sewer system and complete sewage treatment facilities, Stayton, Oregon. (civil) Client, City of Stayton, Ore.

¶ Preliminary design of all-purpose armory and 4500-seat auditorium, including 240-ft clear span roof over field house, Salem, Oregon. (civil, struc., mech., elec.) $480,000 (auditorium). Client, J. L. Payne, Architect.

PENNSYLVANIA

George J. Parros
Pittsburgh, Pennsylvania

¶ Osteopathic hospital, Sharon, Pa. (mech.) $300,000. Client, Hunter, Heiges & Gross, Architects.

¶ Reynolds high school, Greenville, Pa. (mech.) $340,000. Client, Hunter, Heiges & Gross, Architects.

¶ Holy Trinity Greek Orthodox Church. (mech.) $60,000. Client, James Mitchell, Pittsburgh, Pa.

¶ Overmyer Mould Company, Greensburg, Pa. (mech.) $80,000. Client, Sorber & Hoone.

¶ Harrison Park elementary school. (mech.) $120,000. Client, Sorber & Hoone.

¶ Somerset high school, Somerset, Pa. (mech.) $400,000. Client, Sorber & Hoone.

Buchart Engineering Corporation
York, Pennsylvania

¶ Marysville Methodist Church, Marysville, Pa. (struc.) $35,000. Client, Buchart Associates, Inc.

¶ Mt. Joy elementary school, Mt. Joy, Pa. (struc.) $425,100. Client, Buchart Associates, Inc.

¶ Westside osteopathic hospital, York, Pa. (struc.) $1,820,000. Client, Buchart Associates, Inc.

¶ New Cumberland motel and commercial center, New Cumberland, Pa. (struc.) $257,000. Client, Buchart Associates, Inc.

Evans & Associates
Cleveland, Ohio

¶ Prendergast high school, Philadelphia, Pa. (mech.) $50,000. Client, architect.

¶ Ravenhill Academy, Philadelphia, Pa. (mech.) $100,000. Client, architect.

Gustav Stueber, P.E.
Pittsburgh, Pennsylvania

¶ Library building, Indiana State Teachers College, Indiana, Pa. (struc.) $300,000. Client, Joseph Hoover, Architect.

Walter E. Spotts and Associates
Reading, Pennsylvania

¶ Preparation of plans for installation

When it comes to Clock and Program Systems...

Select the LEADER... STANDARD

TRADEMARK

STANDARD, the world's leading manufacturer of this equipment, offers you the *only* clock and program systems with *all* these features:

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KEEP FAITH–Standard's jealously guarded reputation for fair dealing . . . for never letting a customer down . . . is built on a solid foundation–75 years of specialization in electric clock and program systems.

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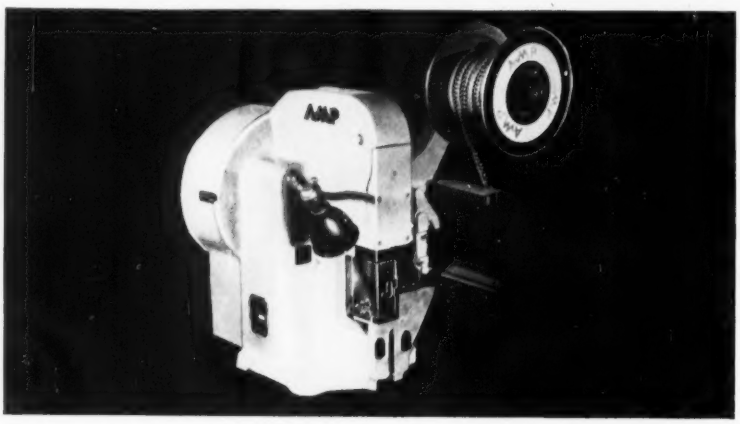

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is the best feature

All the unusual features of the A-MP tool-and-terminal method which have created AMP's outstanding reputation are a result of one major feature: experience or "know how".

This experience is unmatched by any other organization in the world. The proof of it is in AMP's electrical circuit terminations, that is, a fine A-MP terminal crimped precisely and uniformly to your circuitry leads. A-MP "know-how" also means the lowest total installed cost—no extra parts, no multi-step assembly operations . . . just an A-MP tool and a supply of A-MP terminals.

Highest reliability without fuss or muss at the lowest total installed cost anywhere . . . experience says you can't beat such a combination.

Why not write for more information today on your particular circuitry termination requirements.

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and construction of sanitary sewage disposal system over complete Borough of Kenhorst, Berks County, Pa. (civil) $680,000. Client, Borough of Kenhorst.

Zenith Engineering Corporation
Philadelphia, Pennsylvania
¶ Control rod mechanism for atomic reactors. (mech., elec.) $500,000. Client, Chempump Corporation.
¶ Proportioning pump. (mech., elec.) $125,000. Client, Chempump Corp.

Cozza & Critchfield
Pittsburgh, Pennsylvania
¶ Five miles of highway, Homer City, Indiana County, Pa. (civil, struc.) $3.5 million. Client, Pennsylvania Department of Highways.

TENNESSEE

William F. Appleton
Kingsport, Tennessee
¶ Addition to Fall Branch Consolidated School, Washington County, Tennessee, including heating, electrical, and plumbing layouts, plus septic tank and disposal field systems. (civil, mech., elec.) $100,000. Client, Beeson & Beeson, Architects, Johnson City, Tennessee.

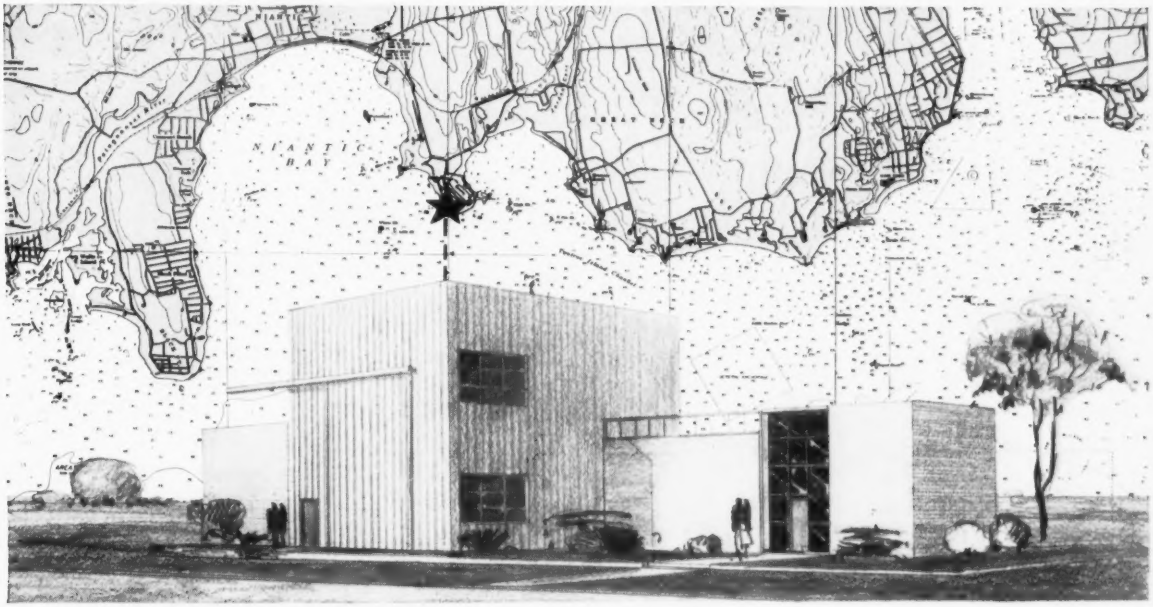
TEXAS

Acrey and Stephenson
Dallas, Texas
¶ Storm sewer and street improvements, Dallas, Texas. $70,000. Client, City of Dallas, Texas.
¶ Storm sewer and paving plans for various alleys, Dallas, Texas. $40,000. Client, City of Dallas, Texas.
¶ Street, water, sewer, and storm sewer, design and inspections, Duncanville, Texas. $500,000. Client, Flame Dev. Co.
¶ Superior Baking Company. (struc.) $200,000. Client, Jack Hinman, Architect, Garland, Texas.
¶ Bella Vista Baptist Church. (struc.) $90,000. Client, Jack Hinman, Architect, Garland, Texas.

Winston & Schwegmann
Dallas, Texas
¶ Southwestern Bell Telephone Co. switchboard modernization, Houston, Texas. (elec.) $200,000. Client, Southwestern Bell Telephone Co.
¶ All electrical engineering in connection with building and four 1200- and two 700-hp motors at Southcliff booster station. (elec.) $175,000. Client, City of Dallas, Texas.

VERMONT

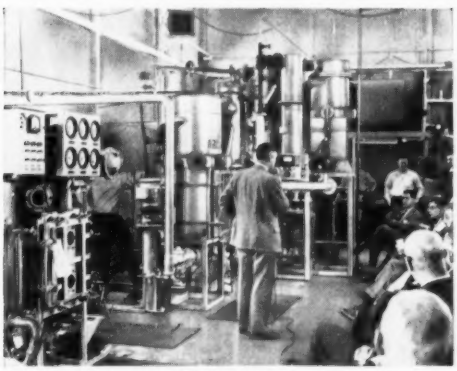
Thomas W. Reed
Pittsford, Vermont
¶ Montpelier Savings & Trust Co., Montpelier, Vermont. (elec.) $9000. Client, Helmer & Cole, Architects.
¶ Windsor high school addition, Windsor, Vermont. (elec.) $7000. Client, Helmer & Cole, Architects.
¶ New elementary school, Dorset, Vermont, including eight classrooms and



MAXIM EXPANDS MARINE LABORATORY

to step up evaporator testing under actual sea water conditions

Pipeline extends off shore to bring full density sea water into laboratory.



Inside laboratory, typical evaporator demonstration is being conducted.

Maxim's Marine Laboratory on Millstone Point, at Waterford, Connecticut, is being enlarged to allow a stepped-up program of evaporator research, development and production testing. One of the primary advantages of this facility — the first of its kind — is that it is located directly on the shore, where *full density* sea water is always in continuous supply.

Maxim's laboratory serves four main functions: (1) to test evaporators, at customer's option, before installation; (2) to test and evaluate equipment, accessories and materials on a continuous basis; (3) to develop and test modifications, improvements, new procedures and techniques; (4) to train customer's operating personnel.

These are some of the reasons why Maxim Sea Water Distillation Units are dependably efficient and cost less to operate and maintain — and why, if you need an evaporator, you can specify Maxim with confidence.

SEND FOR INFORMATION ABOUT MAXIM:

- Low Pressure Steam Evaporators
- Flash Evaporators
- Steam-Jet Compression Evaporators
- Waste Heat Recovery Evaporators
- Vapor Compression Evaporators

Emhart Manufacturing Company

Maxim Division

80 Homestead Ave., Hartford 1, Conn.

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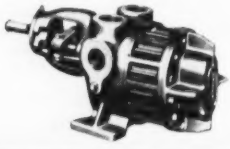
There's a Roper to Fit Your Needs

Series T .3 to 55 GPM
Choice of 192 Models

Pump and motor units . . . pump serves as end bell of motor. Require minimum space . . . easily installed . . . no coupling required . . . mount in any position. Each unit approximately same size as NEMA motor of HP required for driving. Open drip proof or totally enclosed motors; single or three phase as required.

ROPER
ROTARY PUMPS



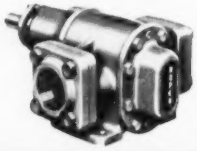
Series F 1 to 300 GPM
Pressures to 300 PSI

Feature helical steel pumping gears, hardened steel shafts, bronze flange-type bearings. 4-port design with 8 optional piping arrangements (4 for CW and 4 for CCW rotation) solves installation problems. With or without built-in relief valve in either mechanical seal or packed box construction.

ROPER
ROTARY PUMPS

Series K ¾ to 50 GPM
Pressures to 150 PSI

Extremely compact in all sizes. Helical pumping gears are hardened steel, with steel shafts and bronze bearings. Sizes 10 through 50 GPM have patented venturi suction and discharge principle for smooth flow and quiet operation. With or without built-in relief valve; packed box or mechanical seal.



ROPER
ROTARY PUMPS

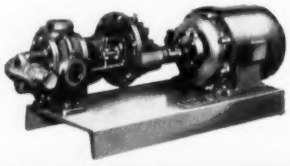
Series H 5 to 75 GPM
Pressures to 1000 PSI

Designed to operate at direct motor speeds. Used for all types of hydraulic mechanisms where high pressures are required. Hardened steel spur gears for maximum efficiency, and heavy duty roller bearings and bronze wear plates for long life service. Mechanical seal or packed box.

ROPER
ROTARY PUMPS

Series 3600 40 to 300 GPM
Pressures to 100 PSI

Handle thick or thin liquids at slow speeds. Operate in either direction. Hardened iron pumping gears, hardened steel shafts, heavy duty bronze sleeve bearings. Mechanical seal or packed box. Series includes tank truck pumps as well as single motor driven units with gear reduction.



ROPER
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Send for "How to Solve Pumping Problems"

Roper Hydraulics, Inc.
332 Blackhawk Park Avenue
Rockford, Illinois
Manufacturers of Standard, Special and Custom Pumps for All Industries

multipurpose room. (elec.) $13,000. Client, Helmer & Cole, Architects.
¶ Renovation of main floor of Vermont National & Savings Bank, Woodstock, Vermont. (elec.) $2000. Client, Helmer & Cole, Architects.
¶ Floodlighting for the Ethan Allen Air Force Base, Winooski, Vermont. (elec.) $4500. Client, Ethan Allen Air Force Base, Winooski, Vermont.

VIRGINIA

William F. Appleton
Kingsport, Tennessee
¶ Piping design for new cafeteria-kitchen for Virginia Intermont College, Bristol, Virginia. $40,000. Client, C. B. Kearfott, Architect, Bristol, Va.

Lester V. Johnson Associates
Arlington, Virginia
¶ Housing project; 750 homes, 40,000 feet of streets and utilities, Vienna, Virginia. (civil, struc., mech., elec.) $12.5 million. Client, Vienna Development Corp. and Yeonas Development Corp., Vienna, Va.

Sowers, Knowles & Rodes
Roanoke, Virginia
¶ Lexington motel, Lexington, Virginia. (mech., elec.) $300,000. Client, Wells & Meagher, Roanoke, Virginia.
¶ Low rent housing, Danville, Virginia. (mech., elec.) $1 million. Client, William Patterson, Danville, Virginia.

WISCONSIN

Carl C. Crane, Inc.
Madison, Wisconsin
¶ Plans and specifications for two miles of 48-in. prestressed concrete water feeder main. (civil) $983,000. Client, City of Milwaukee, Wisconsin.

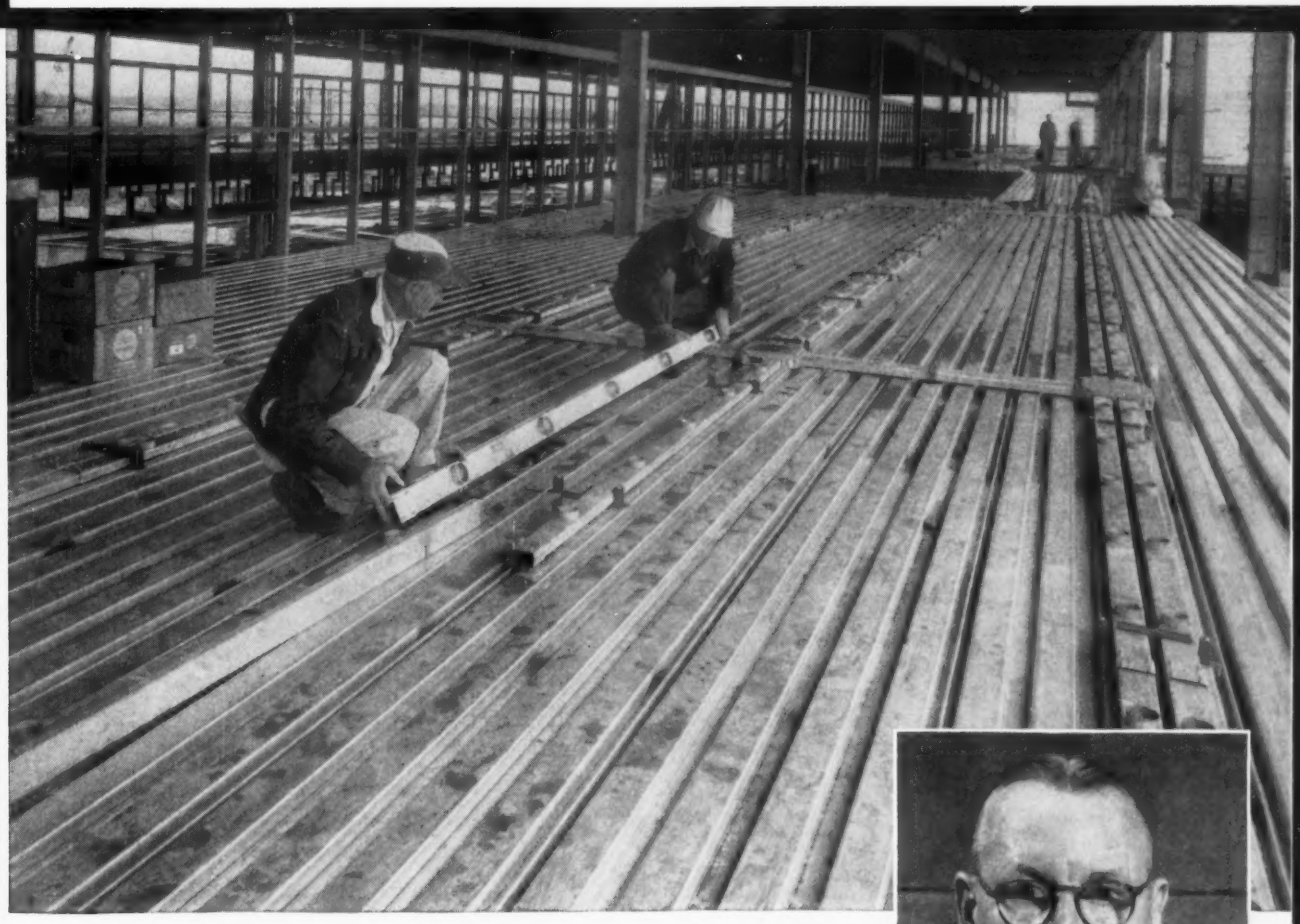
R. J. Abramson & J. M. Klipp
Chicago, Illinois
¶ Empire office building, Milwaukee, Wis. (mech., elec.) $18,000. Client, Sol Speigel.
¶ Bradley Shopping Center, Brown Deer, Wis. (civil, mech., elec.) $250,000. Client, Sidney H. Morris & Associates.
¶ Silver Spring Shopping Center, Milwaukee, Wis. (civil, mech., elec.) $400,000. Client, Sidney H. Morris & Assoc.

Collings-Vranich & Associates, Inc.
Milwaukee, Wisconsin
¶ Engineering building and research laboratory. One-story, masonry, panel-wall, precast concrete roof, air conditioned. (civil, struc.) $250,000. Client, Wisconsin Motors Corporation.

WYOMING

Paul H. Koch
Denver, Colorado
¶ Jeffrey City school, Jeffrey City, Wyo. (mech.) $42,650. Client, K. L. Krusmark.

Ken R. White
Denver, Colorado
¶ Complete 24-unit plant camp development, Opal, Wyo. (civil, struc., mech.,



SPANG Underfloor Duct provides for future wiring expansion at Moisant International Airport

"We installed over 6,500 ft. of SPANG Underfloor Duct on the second and third floors and West Pier at Moisant International Airport Terminal Building in New Orleans to handle power and telephone wiring," says Mr. Walter J. Barnes, proprietor of Walter J. Barnes Electric Company, New Orleans, Louisiana.

Offers many advantages

"SPANG Underfloor Duct offers ease of handling and installation plus clearly-marked junction boxes that practically eliminate installation mistakes. Power and phone lines are readily accessible at regular intervals. Future expansion and office changes in the terminal building will be easily handled, regardless of wiring requirements, without extensive or costly construction."

Helps you save money

Get all the facts about how SPANG Underfloor Duct . . . and SPANG Header-duct and newly-designed SPANG Fittings . . . can help you make fast, *top-quality* installations. Write for complete literature, or phone your nearest SPANG Representative.

Architect: Goldstein, Parham & Labouisse; Herbert A. Benson and George J. Riehl, New Orleans, La.

Electrical Engineer: Louis N. Goodman & Associates, New Orleans, La.

General Contractor: J. A. Jones Construction Company, Charlotte, N. C.

Electrical Contractors: Walter J. Barnes Electrical Company, and Gibson & Odom, Electric Contractors, New Orleans, La.

"We've used SPANG Underfloor Duct before," says Mr. Walter J. Barnes. "Its adaptability to future expansion was an important factor in its selection for the Moisant job." Airport serves 14 airlines.

SPANG Underfloor Duct is quickly installed. Light weight aluminum junction boxes contribute to easy handling; box design helps prevent costly installation errors. Laid over a steel sub-floor, duct was covered with concrete after it was positioned and fastened down.

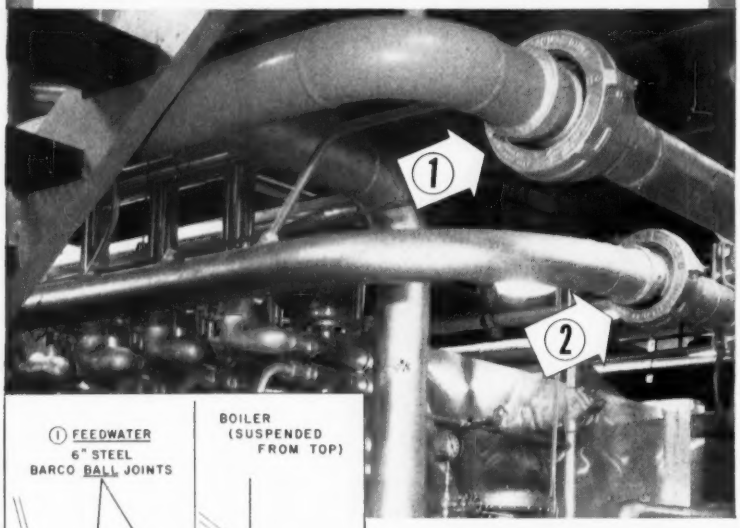
SPANG UNDERFLOOR DUCT

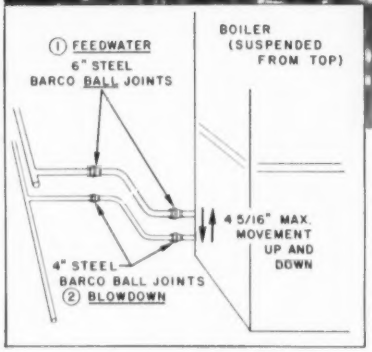
THE NATIONAL SUPPLY COMPANY

Subsidiary of Armco Steel Corporation

TWO GATEWAY CENTER, PITTSBURGH, PA.

. . . where BOILERS move UP and DOWN





BARCO Ball Joints

The schematic diagram at left shows how Barco Flexible Ball Joints of steel construction are used in a new Florida utility plant—design pressure 600 psi, 500 F. The above photo shows a close-up view of two of the joints (see arrows). Two more matching joints, 4" and 6", are located out of the picture to the left. The 4" joints have metal gaskets. The same utility also uses 10" Barco joints on gas fuel lines. Other uses in power plants are for flexible connecting lines to oil burners, soot blowers, and other auxiliary equipment.

Flexible Pipe Connections!

The rapidly increasing use of Barco Flexible Ball Joints for solving piping problems in POWER PLANTS is significant for several key reasons:

1. Substantial *space saving* as compared to other methods in crowded piping areas.
2. Unlimited flexibility and movement. Utmost simplicity.
3. No heavy pipe anchoring required. No "end thrust" developed under pressure.
4. Ability to handle compound movement (where twisting is combined with thermal expansion and contraction).
5. Easy to engineer joints into piping to provide for any degree of flexibility, expansion, or movement required.
6. Maximum safety for high temperature applications. All-metal construction available. Special alloys can be specified.
7. Basic design is pressure sealing against leakage and self-adjusting for wear.
8. Virtually no deterioration. Able to stay in service for years without repairs or maintenance. No lubrication.

New Bulletin No. 31 contains interesting diagrams showing how to solve many common pipe expansion problems EASILY, ECONOMICALLY. *Ask for a copy;* see your nearest Barco representative or write:

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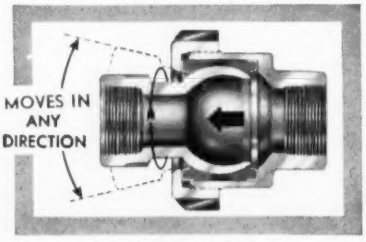
BARCO MANUFACTURING CO.
572C Hough Street, Barrington, Illinois

The Only Truly Complete Line of Flexible Ball, Swivel, Swing and Rotary Joints

In Canada: The Holden Co., Ltd., Montreal



elec.) $285,000. Client, El Paso Natural Gas Company.

¶ Canyon Ranches swimming pool, Laramie, Wyo. (struc.) $250,000. Client, Paul Reddy, Architect.

FOREIGN

E. J. Kelly & Associates, Inc.
Los Angeles, California

¶ Cannery expansion, Mindanoa, P.I. $120,000. Client, California Packing Corp.

O. G. Moffat, Ltd.
Hamilton, Canada

¶ 5 Mw pool-type nuclear reactor for McMaster University, Hamilton, Ontario; air conditioning, heating, piping, electrical. Reactor by A.M.F., New York. $2 million. Client, N. R. Souter and Associates, Architects.

Bouthillette & Parizeau
Montreal, Canada

¶ *Hopital des Laurentides,* mental hospital with capacity of 800 beds, located at L'Annonciation. (mech., elec.) $2 million. Client, Provincial Government of the Province of Quebec.

¶ Montreal city hall and annex, police headquarters, and courts. Existing building to be completely renovated and new extension to be built to provide double the original floor area. Air conditioned. (mech., elec.) $1.5 million. Client, City of Montreal.

D. B. Steinman, Consulting Engineer
New York, New York

¶ Single-track railroad bridge over Indus River between Rohri and Sukkur, about 300 miles northeast of Karachi, West Pakistan. A steel arch with an 810-ft span. (civil) $2.5 million. Client, Government of Pakistan.

Underwood McLellan & Associates Ltd.
Saskatoon, Saskatchewan

¶ Sewage pumping station and treatment plant modification, Regina, Saskatchewan. (civil) $1,850,000. Client, City of Regina, Saskatchewan.

¶ Water and sewage system, Uranium City, Sask. (civil) $1,090,000. Client, Municipal District of Uranium City.

¶ Sewage pumphouse and 150-acre oxidation pond, Swift Current, Sask. (civil) $338,000. Client, City of Swift Current, Saskatchewan.

¶ Biology building, University of Saskatchewan, Saskatoon, air conditioning, heating, ventilating. (mech.) $206,000. Client, Department of Public Works, Province of Saskatchewan, Regina.

Canadian-British Engineering Consultants
Toronto, Canada

¶ Water supply, Town of Dunnville, Ontario. (civil) $500,000. Client, Ontario Water Resources Commission.

¶ Water supply, Town of Campbellford, Ontario. (civil) $300,000. Client, Local utilities commission.

¶ Sewage treatment plant, Town of Port Colborne, Ontario. (civil) $530,000. Client, Town council. ▲▲

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Today Anemostat offers an impressive variety of air diffusion equipment to meet every architectural and engineering requirement. ANEMOSTAT® is a registered trademark. It is your guarantee that every unit bearing this name is of highest quality . . . backed by the most experienced engineering, research and testing laboratories in the industry.

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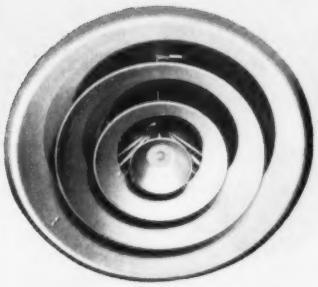
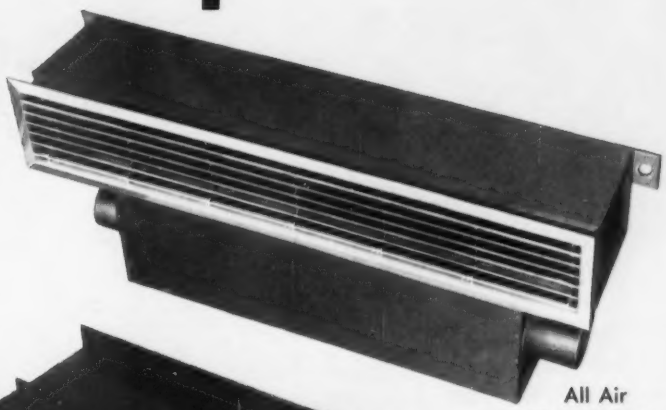
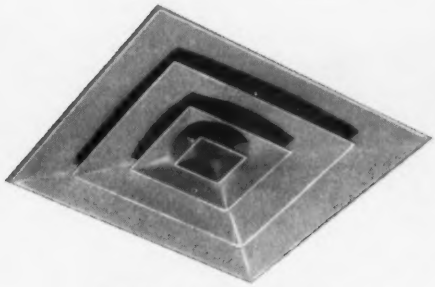


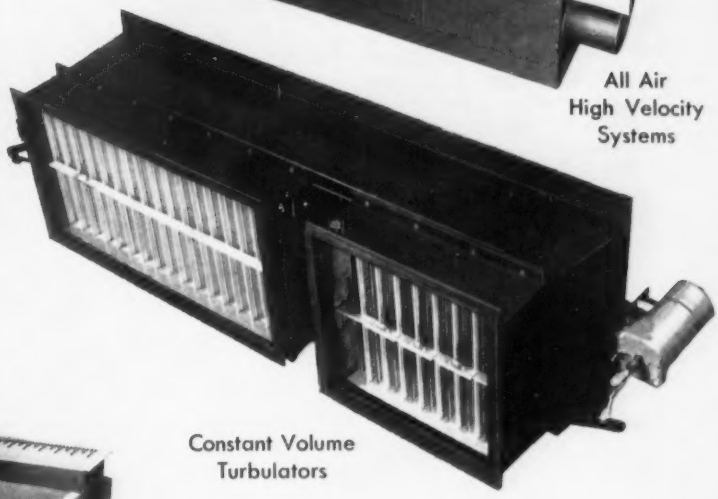
Conventional Air Diffusers



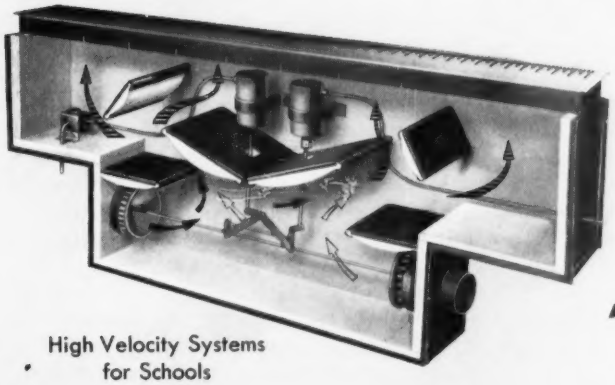
All Air High Velocity Systems



100% Induction Air Diffusers



Constant Volume Turbulators



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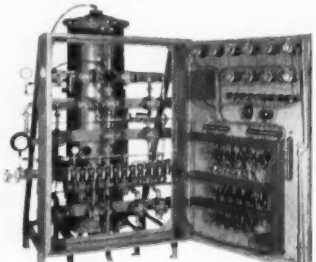
For all types of processes requiring very pure water. Completely automatic. All functions easily adjustable. Completely assembled, ready for hook-up. Made in a range of practical sizes. *Write for particulars* on these new, valuable, and highly adaptable units.



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ILLCO-WAY

Books

For the Libraries of Consulting Engineers

GLASS ENGINEERING HANDBOOK, by E. B. Shand; McGraw-Hill Book Co., N. Y.; 484 pp.; $10.

Reviewed by
David Hendrickson
The Hinchman Corporation

There has been a great expansion in the use of glass by engineers in the past 25 years. New glasses and processes have been developed to meet the requirements of new engineering and scientific uses. Today there are about 500 different glass compositions in commercial use, exclusive of optical glasses.

Glass and the problems involved in its specification are sufficiently complex so that an engineering analysis must be made. But the average consulting engineer does not have time to qualify himself as a glass technologist. He must rely on a good handbook for his information. Furthermore, he often does not have time to read a whole textbook or a handbook to obtain specific information which may be only an incidental item to the main engineering project. However, he must obtain the right answers, since there is a specific environment in which one type of glass is more suitable than another. This is particularly true in the chemical and processing industries.

This volume provides immediate access to authoritative data, and it should prove to be a timesaver for the busy engineer. For example, if the specific problem was electron bombardment, the index says "see cathode-ray effects." There you will find the glass best suited for this application.

The subject matter of this handbook is divided into four sections: Glass Technology, Glass Manufacture, Applications, and Fibrous Glass. Appendices include Federal and military specifications on glass and definitions of glass terms.

■

ENVIRONMENTAL SANITATION, by Joseph A. Salvato, Jr.; John Wiley & Sons, Inc., N. Y.; 660 pp.; $12.

Reviewed by
Donald D. Paxton
Bridgers & Paxton

This book fills a long-felt need for a complete and practical reference manual on sanitation problems related to small projects. The author, through his many years of experience in public health and sanitation work, covers almost every problem that the average consulting engineer might encounter in this field, including control of communicable diseases, water supply, sewage and waste treatment, swimming pools, food handling, housing, and control of insects and rodents.

The many facets covered by this book are adequately illustrated with empirical formulas, design criteria, public health regulations, construction details, and examples.

The chapter on control of communicable diseases impresses on the reader the fact that sanitation is not a subject to be considered lightly and must be approached with knowledge and extreme care.

GENERAL ELECTRIC'S NEW CALCULATOR

Helps You Specify Transformers

A new calculator and Specifier's Guide have been designed to give you complete information for specifying General Electric's new line of dry-type transformers.

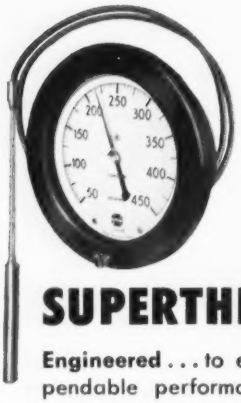
The slide-rule calculator shows ratings, tap details, dimensions, weights, sound levels, the type of insulation, temperature rise, and types of mountings and connections. Also, the calculator has a sample specification form tailored to your individual requirements.

The Specifier's Guide, a buying manual with complete information, has descriptions, installation tips, prices, and where and how to use dry-type transformers.

You'll need this new calculator and Specifier's Guide. They will help you specify General Electric's new dry-type transformers—give you assurance that you're specifying high-temperature silicone insulation and low sound levels for long, reliable transformer service.

Watch your mail; you'll receive your copy soon! Section 412-9, General Electric Company, Schenectady 5, New York.

GENERAL ELECTRIC



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4 CASE SIZES—3½", 4½", 6" and 8½"

3 CASE STYLES—turret, front flange, or back flange mounting, with choice of bezel

FULL SELECTION OF BULBS—virtually endless combinations of bulb sizes, shapes, materials, and connections.

Find Your Nearest Distributor in The 'Yellow Pages'

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Division of American Machine and Metals, Inc. • Sellersville, Pa.

This chapter should be compulsory reading for all engineers even remotely associated with this field.

The book warrants recommendation as a highly practical and usable reference manual.

•

MANAGEMENT IN ACTION: The Art of Getting Things Done, by Lawrence A. Appley; American Management Assn., N.Y.; 382 pp.; $5.

Reviewed
by
Harry Terry
Consulting Engineer

This compendium of the principles of American business management by the president of the American Management Association is made up of a group of stories held together by a common theme. Open the book at any chapter and you have an interestingly written thought for the day. While basically a guide for getting things done in business and industry, the practicing consulting engineer also will find the book of great help.

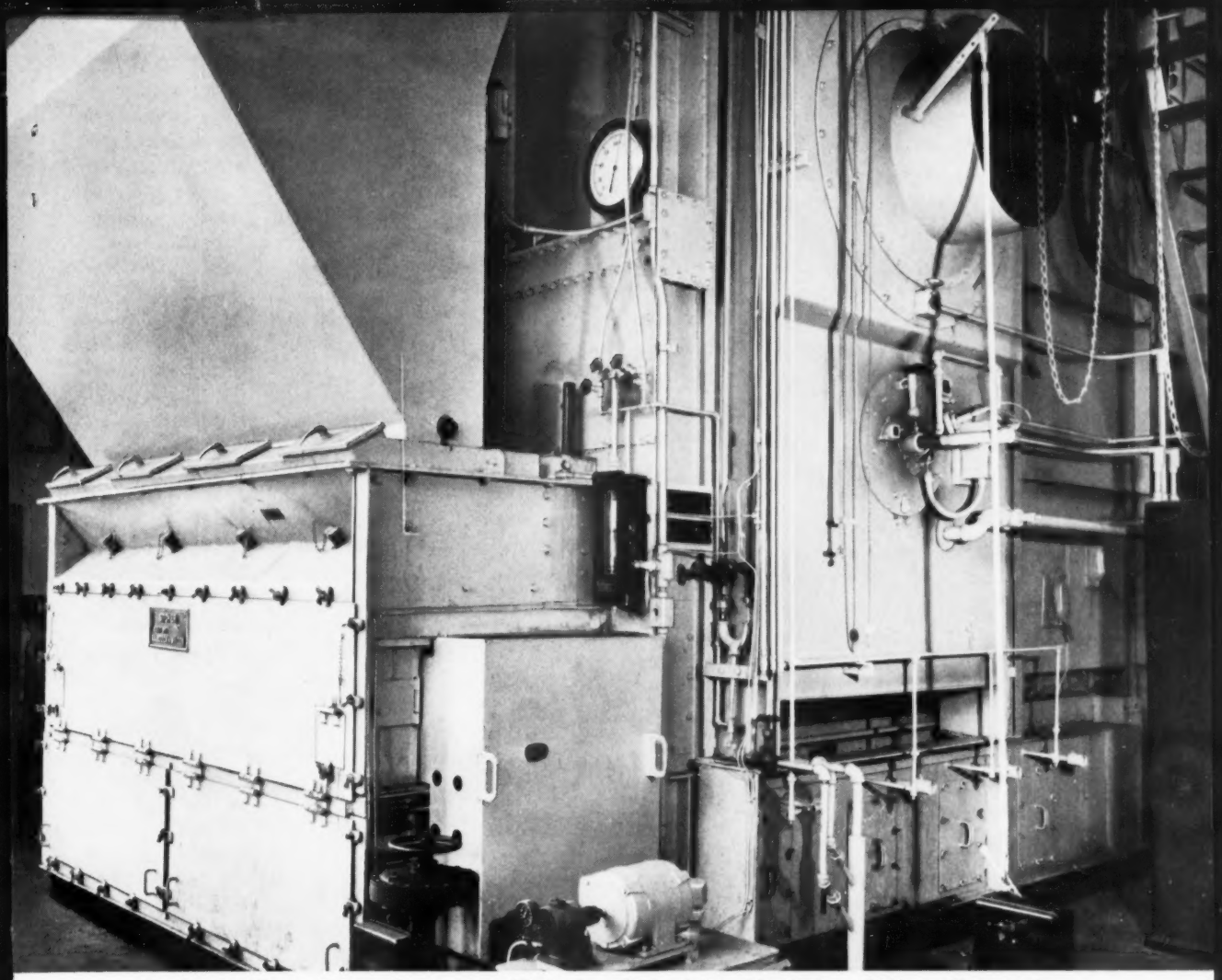
Part I, which tells the reader "how to do it," consists of 78 articles averaging less than four pages each. The groupings are: The Spirit of an Organization, The Character of an Organization, The Valley of Decision, The Management of Men, A Personal Philosophy of Management, Management and Communication, The Profit Motive, Tools and Techniques of Management, The Making of a Manager, and The Way Ahead.

Part II, the last 63 pages of the book in six chapters, outlines and evaluates management, its meaning, and its future. It tells the reader "what to do."

•

HANDBOOK OF PHYSICS, edited by E. U. Condon and Hugh Odishaw; McGraw-Hill Book Co., N. Y.; 1504 pp., 784 illustrations; $25.

This formidable volume, consisting of 90 chapters covering every important aspect of modern and classical physics theory, includes



B&W Integral-Furnace Boiler at Case Institute of Technology, Cleveland, Ohio, has a capacity of 24,000 lb of steam per hr at operating pressure of 225 psi and design pressure of 250 psi. Consulting Engineer: McGeorge-Hargett & Associates, Cleveland. Illustration above shows a view of the stoker in the front wall and gas burner in side wall.

B&W INTEGRAL-FURNACE BOILER PROVES VERSATILITY AT CASE INSTITUTE

Specially Designed Firing System Provides Two Steam Output Ranges

Faced with the problem of heavy steam loads in winter and greatly reduced loads in summer, Case Institute of Technology, Cleveland, Ohio, installed a B&W Integral-Furnace Boiler with a dual firing system.

To answer heavy load requirements during the winter heating season, the boiler is fired by a B&W Jet-Ignition Stoker. Operating as a coal-burning unit, it economically supplies steam for heating, laboratories, and other uses at 6,000 to 24,000 lb of steam per hr. During the light load summer months, boiler-firing switches to a natural gas unit built into the furnace wall. This forced draft burner is fitted with automatic combustion controls for a lower steaming range of 2,000 to 10,000 lb of steam per hr.

Flexibility of operation in this B&W installation is a highly economical answer to the "peak and valley" seasonal demand faced by Case. The two firing arrangements operate completely independent of each other.

Efficient, trouble-free performance is another reason why B&W Integral-Furnace Boilers are consistently selected by institutions and for commercial and industrial installations throughout the country. Completely integrated units, B&W Boilers are backed by the undivided responsibility of one manufacturer with nearly a century of steam generating experience, and a national network of plants and field engineers. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

G-861-FF

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BOILER DIVISION

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There are reasons for the increasing use of Sparling Propeller Meters. The main reason is that *totalization is Sparling's primary step*... after all, the usual purpose of metering is to determine the total amount of water. Rate indication and recording is Sparling's *secondary step*. Furthermore, with Sparling's free-flow design there is practically *no pressure loss*, an important economic consideration in flow measurement. Sparling meters are guaranteed accurate within 2% when properly installed. Finally, Sparling meters enjoy long life, free of any real problems of wear, incrustation, and corrosion, Recently, a 4-inch meter was "opened" for routine inspection, after 20 years of accurate service, and it showed no wear affecting accuracy. Start towards good metering now, write today.

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contributions from 89 authorities. The book is divided into sections on mathematics, mechanics of particles and rigid bodies, mechanics of deformable bodies, the solid state, electricity and magnetism, heat and thermodynamics, optics, and atomic and nuclear physics.

For the consulting engineer, this handbook will serve as a convenient reference source for the complete understanding of physics theory relating to everyday problems. It also will enable the consultant to find quickly answers to complex scientific questions.

•

BIBLIOGRAPHY OF EFFECTS OF SOIL CONDITIONS ON EARTHQUAKE DAMAGE, compiled by C. Martin Duke; Earthquake Engineering Research Institute, 465 California St., San Francisco 4, Calif.; 47 pp.; $1.

The engineer designing structures in seismically active regions must be more than routinely familiar with soil and subsurface conditions that might influence the probability of damage in an earthquake. Studies to determine the relationship between soils and earthquake damage include records of ground conditions and destruction at the site of large earthquakes; field and laboratory investigations of small natural and simulated earthquakes; and theoretical approaches to the problems.

This bibliography includes 275 entries and covers published material in each of these three areas.

•

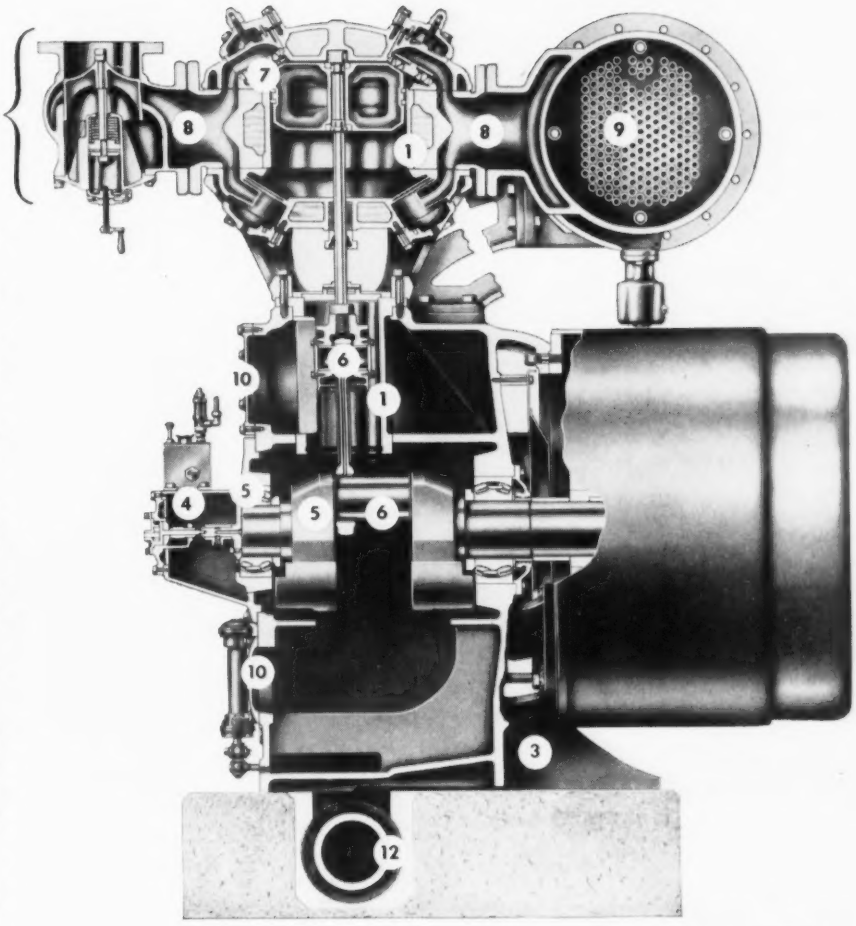
FLUID METERS — THEIR THEORY AND APPLICATION, fifth edition; The American Society of Mechanical Engineers, N.Y.; $8.

The latest edition of this popular reference work includes up-to-date information on a number of recently developed fluid meters and metering procedures. Like the fourth edition, it is divided into three sections. The first gives the classification and nomenclature of fluid meters; the second outlines

uses at 6,000 to 24,000 lb of

sistently selected by institutions

DIVISION



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MAINTENANCE: All wearing parts—valves, crosshead guides, cylinder liners, etc.,—are field replaceable. This is an exclusive Joy feature. No special tools or special maintenance crew training required.

OPERATION: Precise balance and control requires less horsepower than any other system, delivers greater economy on CFM and KWH per HP.

Joy Compressors range from 1.93 to 6048 CFM with wide choice of Prime movers and drives. Write ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

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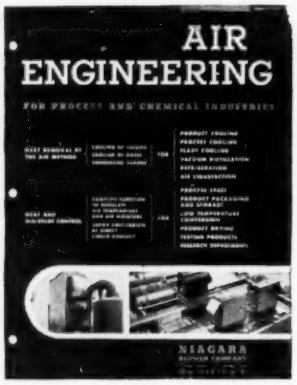

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Write for Bulletin 135

NIAGARA BLOWER COMPANY

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Niagara District Engineers in Principal Cities of U. S. and Canada

LRC **LUZERNE**

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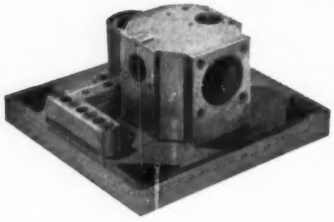

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MAIN OFFICE AND FACTORY — TRENTON, N. J.

the theory of fluid measurement; and the last section includes tables for use in solving fluid measurement problems.

Gravitational units are used in the development of equations and the presentation of physical data. Coefficients of differential head meters are presented on the basis of Reynolds number in the belief that this method is of greater convenience to the user.

•

MAINTENANCE HINTS, a new 650-page handbook, has been published by Westinghouse. The 5 x 7-inch leatherette-bound manual is a guide to modern maintenance practices on all types of electrical equipment. It is available for $2 from Westinghouse Electric Corp., P.O. Box 2099, Pittsburgh 30, Pa.

•

The International Atomic Energy Agency has published a comprehensive handbook of internationally compiled recommendations for users of radioisotopes. *Manual of the Safe Handling of Radioisotopes,* covering engineering, organizational, and medical aspects of safety practices, was prepared by 13 experts from 10 countries. English versions of the text are available from the IAEA, Vienna, Austria; price is $1.

•

A 16-page booklet, *Du Pont Elastomers in Industry,* outlines the characteristics and engineering properties of two synthetic rubbers — neoprene and Hypalon. The booklet discusses the specialized applications where these polymers are at their best — as hose; belting; packings, seals, and O-rings; protective coatings; and tank linings. A comprehensive table compares such important properties of common industrial rubbers as tensile strength, hardness, abrasion resistance, dielectric strength, and acid and solvent resistance.

The publication is available from E. I. du Pont de Nemours & Co.,

Modernize Electrical Distribution

For more economical operation
increase feeder capacity and efficiency
by transmitting at a higher voltage

To step down the higher distribution voltage to utilization voltage in institutional, commercial and industrial buildings it is important that high efficiency transformers are installed at load centers. SORGEL dry-type transformers are the most practical for this purpose. They require little or no maintenance; no liquid to check or replenish; no vault required; small and compact; easy and economical to install. Sorgel dry-type transformers provide the highest efficiency, which reduces operating costs.

Easy and Low Cost Installation

All self-contained in a single unit — either single phase or 3-phase — with simple connections to make. No separate mounting brackets or junction boxes to make or buy. Substantial wall brackets, or floor mounting base, are an integral part of Sorgel transformers. Roomy connection compartment. Solderless terminals.

45 Kva 3 phase transformer with taps. Interchangeable wall or floor mounting. Connection compartment panel removed.

Substations

The same quiet SORGEL dry-type or Askarel-cooled transformers, in ALL ratings up to 10,000 Kva and up to 15,000 volts, are also incorporated in substations. Procurable with any type or make of switchgear, and from any substation manufacturer.

Sales engineers in principal cities.
Consult the classified section of your telephone directory or communicate with our factory.

Quietest Operation

SORGEL sound-rated dry-type transformers are so quiet in operation that there is no disturbing hum. They are particularly adaptable for installation in hospitals, schools, office buildings, stores, and buildings where sound level is an important factor — as well as industrial applications. Therefore, they can be installed in almost any convenient place, inside of buildings, close to the load center. This results in shorter feeders, better voltage regulation, more efficient distribution, and lower wiring cost.

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SORGEL transformers are guaranteed to carry the full rated load continuously at high efficiency. They are so liberally designed that they can carry an overload during an emergency at a safe operating temperature.

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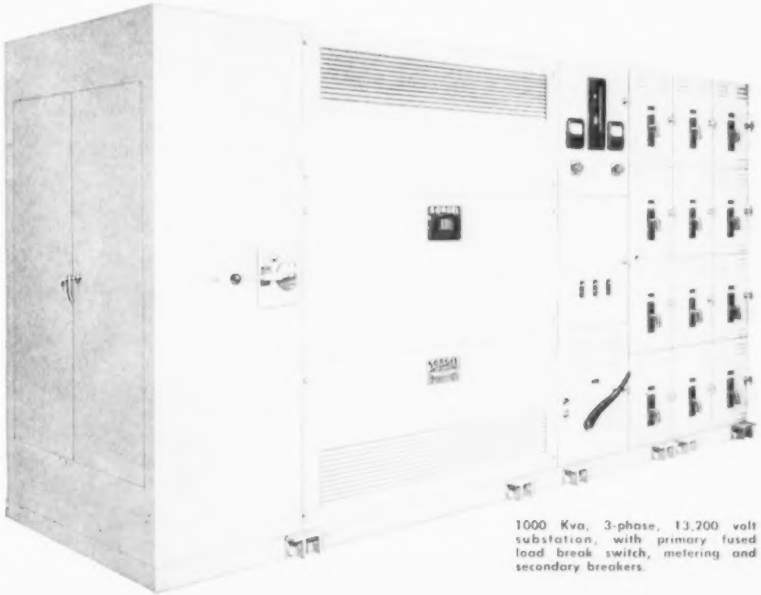
These transformers are available in a large variety of sizes and types for every purpose. ¼ Kva to 3333 Kva single phase. 1 Kva to 10,000 Kva 3-phase. All standard voltages, such as 120, 208, 240, 277, 480, 600, 2400, 4160, 4800, 7200, 13,200, and up to 15,000 volts.



1000 Kva, 3-phase, 13,200 volt substation, with primary fused load break switch, metering and secondary breakers.

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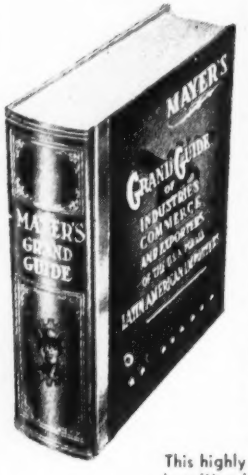

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This highly recommended Guide is printed on first class paper, and is written in two languages: **English** and **Spanish.**

We still have a few copies available of the 1958 (No. 8) edition.

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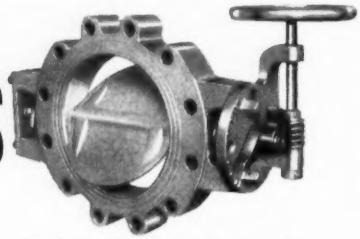
ROCKWELL

"WAFER" VALVES

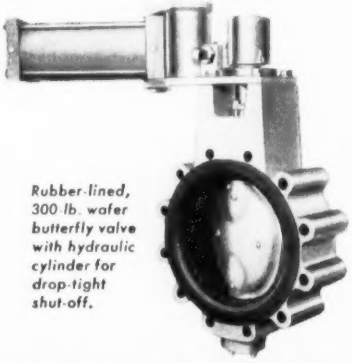


Standard 125-150 lb. wafer butterfly valve with handwheel, also available with lever control or mechanical operators.

- **LOWER IN FIRST COST**
- **NEED MINIMUM SPACE**
- **EASY TO OPERATE**

For controlled throttling or tight shut-off of air, gases, process fluids or semi-solids, Rockwell Wafer Butterfly Valves offer the advantages of rugged construction, compactness, small face-to-face dimension to fit in minimum clearance between pipe flanges.

Write for Bulletin 580.



Rubber-lined, 300 lb. wafer butterfly valve with hydraulic cylinder for drop-tight shut-off.

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Valves—Butterfly · Slide · Diaphragm · Special

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•

The sixth edition of the *Hydrographic Data Book* – a reference guide for engineers working on projects involving measurement of flowing liquids or fluctuating liquid levels – has been published. The 124-page handbook contains information on floatwells and instrument shelters, discusses error in float operated devices, and includes hydraulic tables and conversion charts.

The volume, compiled by J. C. Stevens, Dr. Eng., is available from Leupold & Stevens Instruments, Inc., 4445 NE Glison St., Portland 13, Oregon. Price is $1 per copy.

•

A 5-year compilation of forthcoming national, regional, and state engineering conventions – *Engineering and Technical Conventions* – has just been published. EJC member societies cooperated in producing this 7th annual issue.

The publication lists the date, the place of the meeting, the title or subject of the meeting, the sponsoring organizations, and an alphabetical listing of these organizations and their addresses.

Publisher is the Industrial Relations News, 230 W. 41st St., New York 36, N. Y. Subscriptions, which include the annual fall supplements, are $4 per year.

•

A new reference manual, *Technical Societies Guide*, lists the procedures required by the 36 leading technical societies for the preparation and presentation of technical papers. It includes data on membership structure, principal meeting dates, subjects of interest, mechanics of contribution, policies on preprints and reprints, restrictions and rights to papers and data on society publications, and overall publicity policies.

The 32-page booklet has an authors' section with suggestions re-

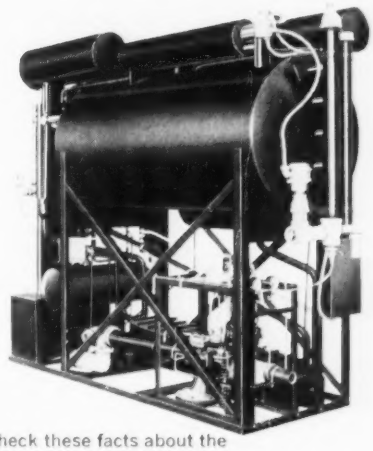
ARCHITECT: JOHN F. STANN; CONSULTING ENGINEER: J. B. WYBLE; BUILDER: SAM EIG

Arkla-Servel Gas Air Conditioning keeps customers cool and operating costs down at the Motel Washingtonian

"While we were planning the Motel Washingtonian, we made a complete study of all potential equipment," states Sam Eig, builder and corporation president of this modern motel near Washington, D. C. "We knew we wanted gas for cooking and heating, and after our investigation, we found gas best for *all* operations."

For air conditioning, the specifications called for Arkla-Servel gas absorptive coolers. "With our Arkla-Servel units, we have no maintenance problems," add Mr. McKeever and Mr. Eig. "And we were able to tie into our heating system without worrying about special housing, vibration, or noise. Our one central system cools in summer, heats in winter to provide us with a quiet, year-round economical operation."

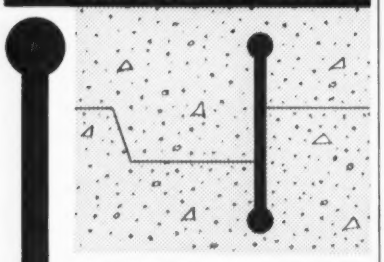
Gas absorptive cooling can put your commercial and industrial clients' heating plant on a year-round paying basis, too. For specific information, take advantage of the consulting services provided by your gas company. They have trained specialists who have been working with architects and engineers for years. Check the facts about gas and you'll see—modern gas air conditioning out-performs all other fuels. *American Gas Association.*



Check these facts about the 25-ton **Arkla-Servel** Cooler

- A compact unit, easy to install and light enough for rooftop installation.
- Costs are low for installation, operation and maintenance. No specially trained operating or maintenance personnel are required.
- Can be installed singly or in banks to fit any size installation.

WATERSTOPS
FOR MASONRY CONSTRUCTION JOINTS



RUBBER or VINYL

Williams Efficiency Waterstops are made from Natural Rubber Stock, and designed for maximum effectiveness in any type of cast-in-place construction joint. They will bend around corners—will not crack or tear from shear action. Tensile Test: 3990 lbs.; Elongation Test: 650%. Available in rolls up to 80 feet in length. Field splicing is simple. Williams Waterstops can also be furnished in Vinyl or Neoprene for industrial uses where resistance to oil and other injurious wastes is desirable. These highly effective Waterstops are now in use in hundreds of industrial plants, commercial and public buildings throughout the country.

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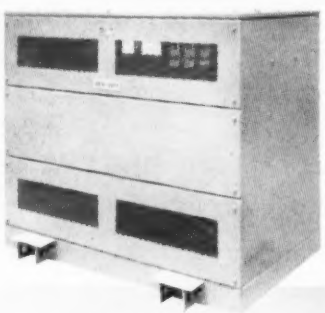

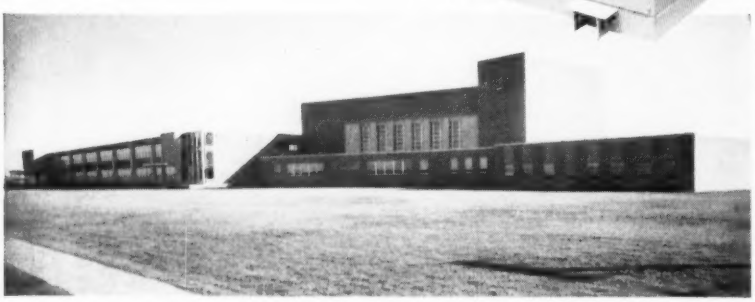

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The proceedings of the 13th Annual Northwest Wood Products Clinic are available from Technical Extension Services, Washington State Institute of Technology. Copies are $2.50 each.

Films

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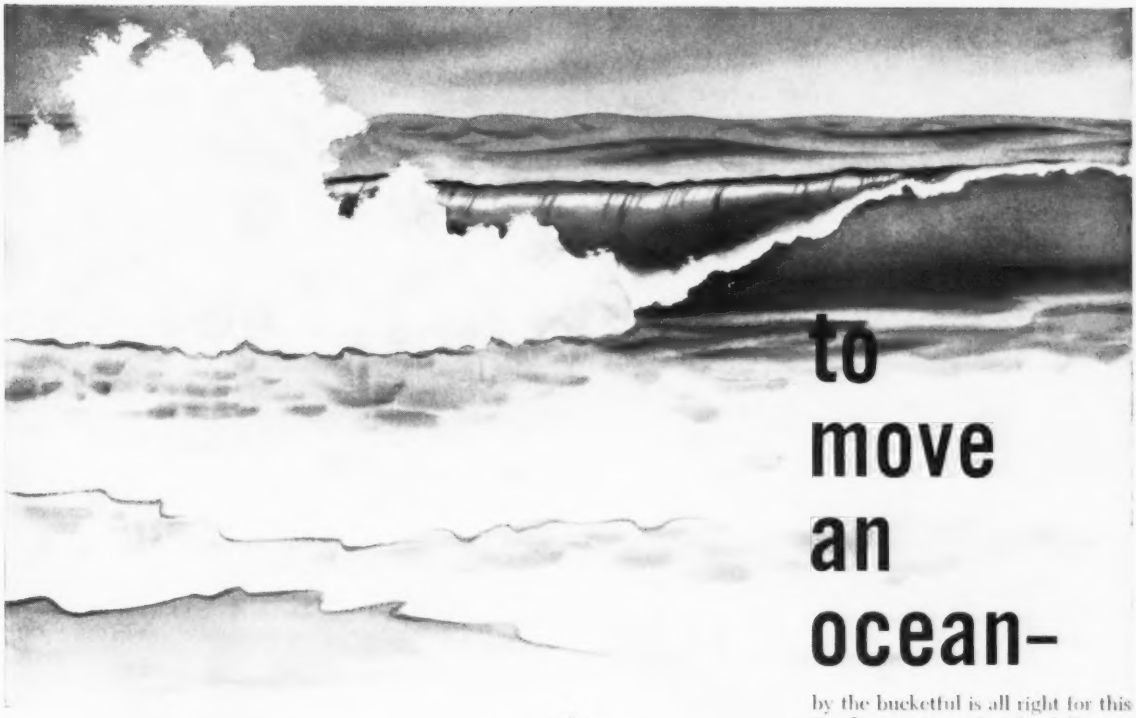

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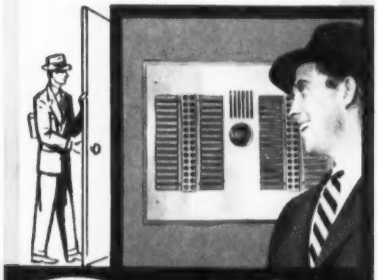

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Feb. 1-4. American Society of Heating and Air Conditioning Engineers; Annual Meeting, Baker and Adolphus Hotels, Dallas, Texas.

Feb. 1-6. American Institute of Electrical Engineers; Winter General Meeting, Statler Hotel, New York, N. Y.

Feb. 3-5. Society of the Plastics Industry, Inc.; Reinforced Plastics Division Conference, Edgewater Beach Hotel, Chicago, Illinois.

Feb. 9-13. American Society of Civil Engineers; Los Angeles Convention, Statler Hilton Hotel, Los Angeles, California.

Feb. 15-19. American Institute of Mining, Metallurgical and Petroleum Engineers, Inc.; Annual Meeting, St. Francis, Sheraton Palace, and Sir Francis Drake Hotels, San Francisco, California.

Feb. 19-21. National Society of Professional Engineers; Winter Meeting, Dinkler-Tutwiler Hotel, Birmingham, Alabama.

Feb. 23-26. American Concrete Institute; Annual Convention, Statler Hilton Hotel, Los Angeles, California.

March 3-5. American Institute of Electrical Engineers; Western Joint Computer Conference, Fairmont Hotel, San Francisco, California.

March 8-12. American Society of Mechanical Engineers; Gas Turbine Power Conference and Exhibit, Netherlands-Hilton Hotel, Cincinnati, Ohio.

March 16-20. National Association of Corrosion Engineers; Annual Conference, Hotel Sherman, Chicago, Illinois.

March 29-April 1. American Society of Mechanical Engineers; Instruments and Regulators Conference, Case Institute of Technology, Cleveland, Ohio.

March 31-April 2. Illinois Institute of Technology; Twenty-First American Power Conference, Hotel Sherman, Chicago, Illinois.

April 5-10. Engineers Joint Council; Nuclear Congress, Municipal Auditorium, Cleveland, Ohio.

April 6-8. Building Research Institute; Annual Meeting, Penn-Sheraton Hotel, Pittsburgh, Pennsylvania.

April 16-17. American Institute of Electrical Engineers; Electrical Problems in the Cement Industry Conference, Allentown, Pa.

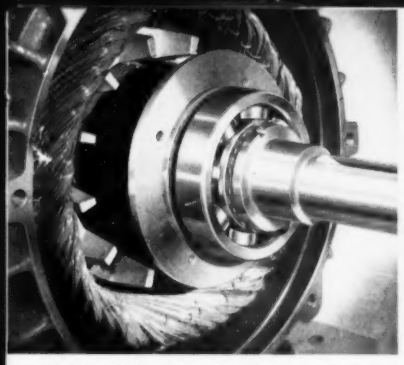
April 19-23. American Society of Mechanical Engineers; Oil and Gas Power Conference, Shamrock-Hilton Hotel, Houston, Texas.

April 28. Association of Consulting Chemists and Chemical Engineers, Inc.; Symposium and Banquet, Shelburne Hotel, New York, N. Y.

May 4-6. Construction Specifications Institute; National Convention, Palmer House, Chicago, Illinois.

May 4-8. American Society of Civil Engineers; Cleveland Convention, Hotel Cleveland, Cleveland, Ohio.

May 20-21. Building Research Institute; Conference on Building Illumination, Statler-Hilton Hotel, Cleveland, Ohio.



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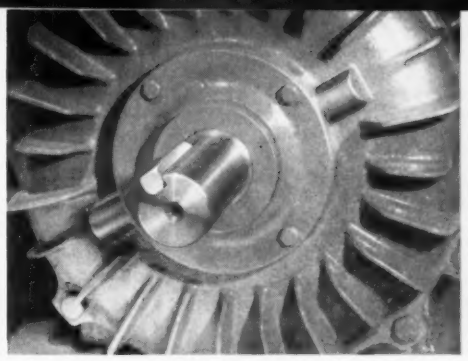

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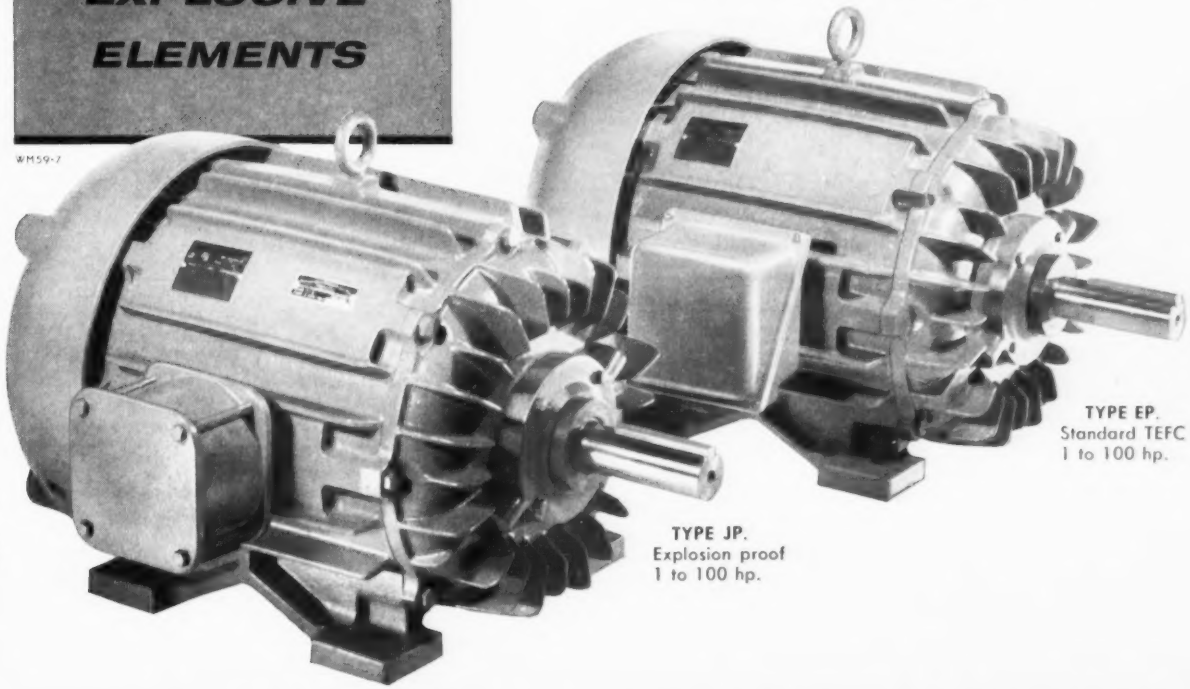

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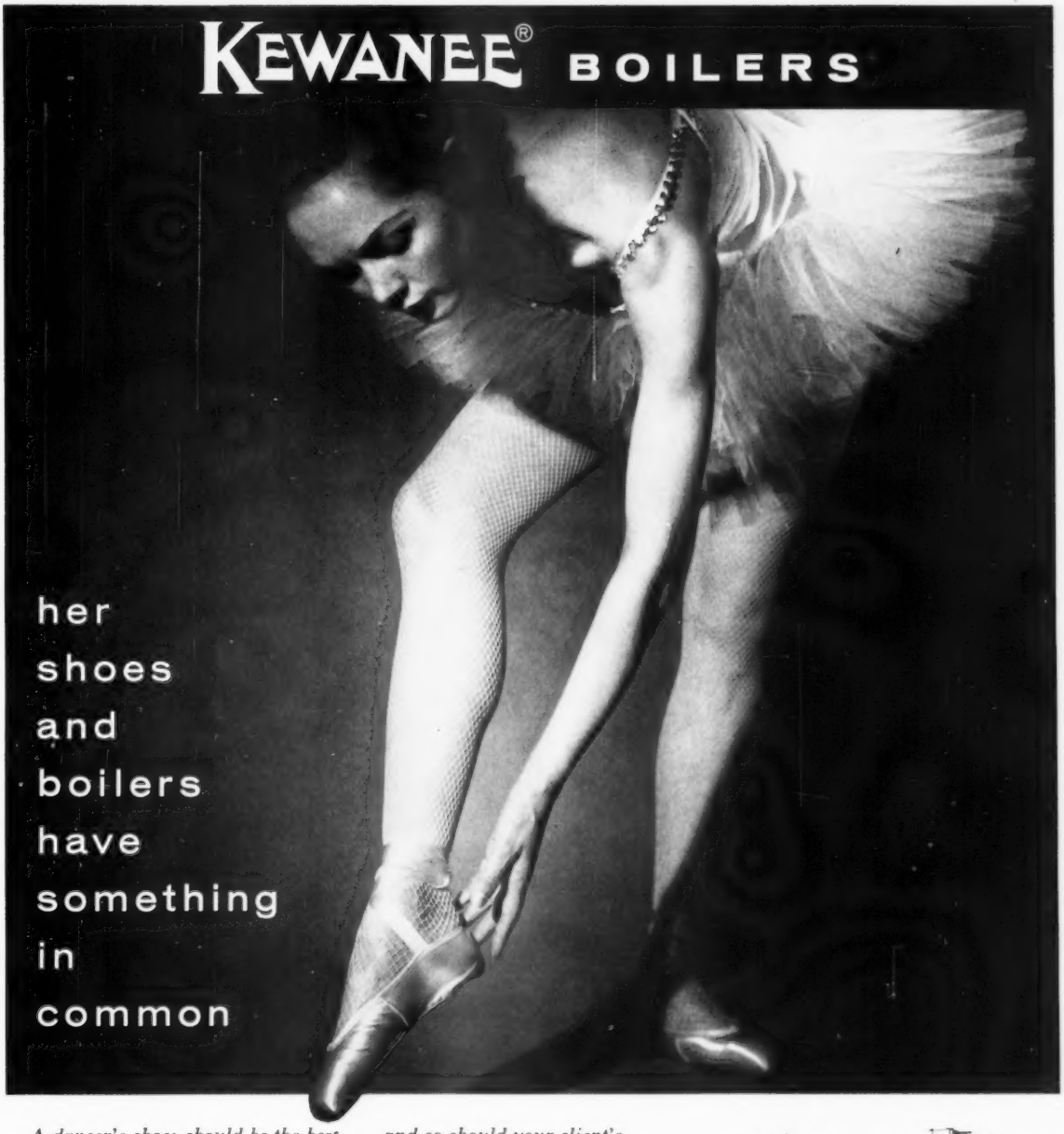

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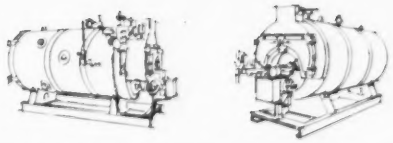

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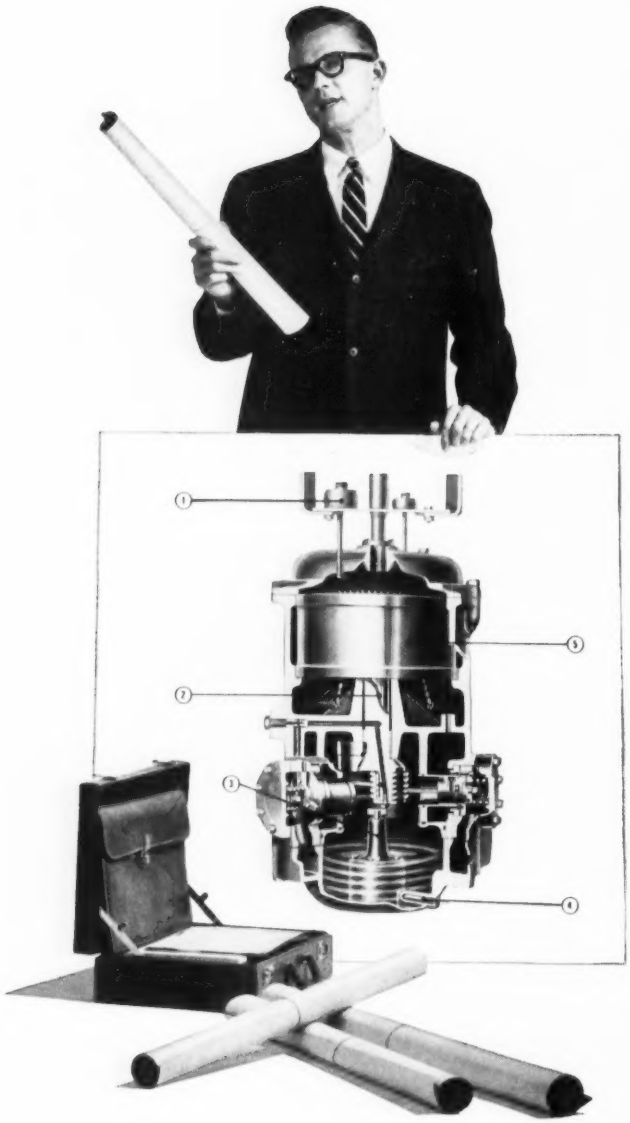

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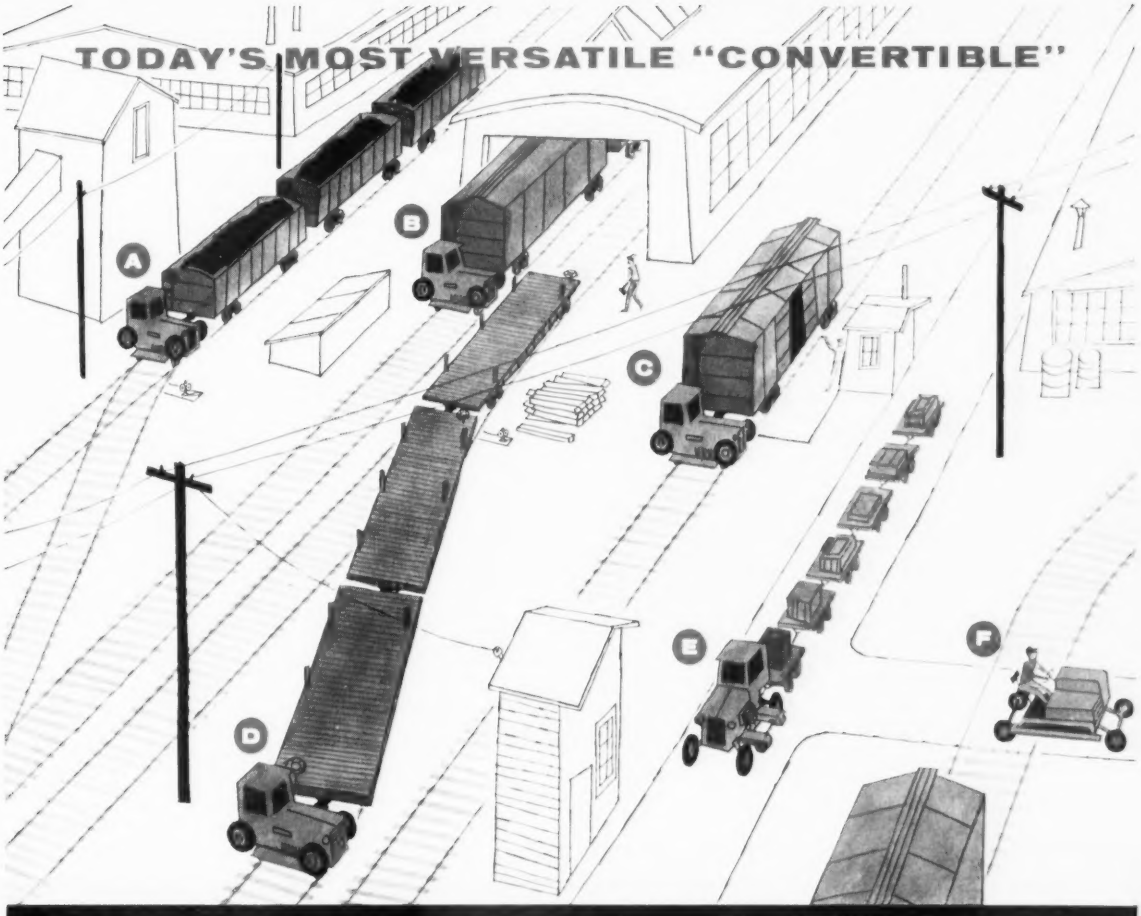

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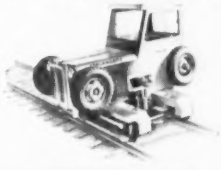

3TM Trackmobile

5TM Trackmobile

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- **D** 3TM Trackmobile returns empties or loaded cars to siding, positions cars where they're needed, frees plant from dependence on switch engines.
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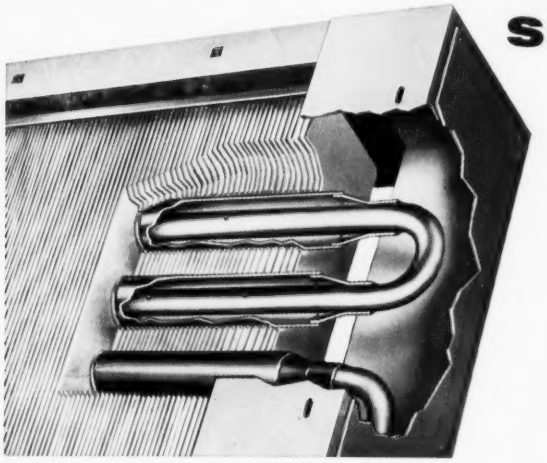
with Nesbitt SERIES T SURFACE

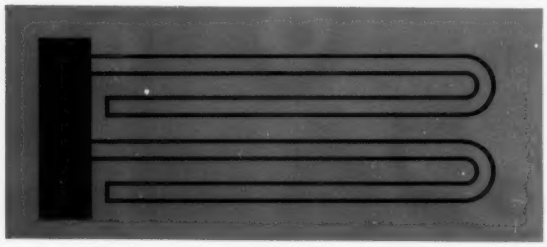


Exclusive Trombone Design provides uniform discharge temperature and maximum freeze protection

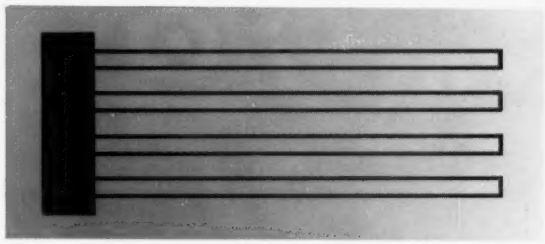
Nesbitt Series T Heating Surface employs a unique principle by which you can achieve uniformity of steam distribution unmatched by conventional arrangements. It is ideally suited to applications requiring direct preheating of outdoor air, or where uniform discharge temperature under throttled control is important.

The trombone-like design delivers steam continuously to adjacent pairs of condensing tubes—doubles the area over which small steam quantities are distributed . . . prevents freeze-up.

Get complete details on capacities and application data now. Write for Nesbitt Publication 305-1.



In Series T design, steam traverses full length of tube, even under modulated conditions. This design prevents "back up" or heat fadeout. Note single connection to supply header for each pair of tubes.



In conventional arrangements, the same steam quantity under throttled control travels only half as far along surface length. Steam fades out toward end of tubes. And there are twice as many connections to the supply header.

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Part 2 February 1959

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1—Air Filters

Bulletin 248-C describes the Model B Roll-O-Matic automatic renewable-media air filter. New design of established product; now shipped in compact cartons, cuts installation time, permits easier storage on job site. Media reinforced for greater strength. Improved drive. Galvanized construction.
American Air Filter Co., Inc.

2—Dust Collectors

Bulletin describes cabinet cloth filter dust collectors and their advantages. Contains illustrations of actual installations together with multiple rating tables, complete specifications, and floor space requirements. Also included are dimensional drawings of the product. Bulletin is printed in 2 colors.
Torit Manufacturing Company.

3—Industrial Dust Data Book

Data book 3-TTC-1 is a 12-page bulletin dealing with the problems and characteristics of industrial dusts. It introduces various sources of dusts, methods of determining particle size, and the chemical properties of various dusts. A section of the bulletin is devoted to the discussion of dust and flyash emission codes.
The Thermix Corporation.

4—Electronic Air Cleaners

Bulletin 76-4369 describes assets of electronic air cleaning and characteristics of Honeywell's "Selector Series" of electronic air cleaners. Covers selection of sizes and capacities in each of four models and three efficiency-ratings, shows added advantages of activated-charcoal filters for removal of odors.
Minneapolis-Honeywell Regulator Co.

5—High Efficiency Cyclones

Bulletin C-103 describes design and construction of Buell high-efficiency Cyclones. Features include exclusive "Shave-off" port which traps extra percentage of dust, particularly smaller fines. Fully illustrated. Lists all information necessary for specifying. Covers importance of manifolding.
Buell Engineering Company, Inc.

6—Dust Collectors

Dustkop model 30X50P, a one-unit system serving 7 grinders. Where floor space is limited, unit is suspended from ceiling or installed on roof. Pipe is angled from collector to caster-mounted dust drum placed in any unused area. Drum is rolled to outside dumping point and emptied without recirculating dust.
Aget Manufacturing Company.

7—Fly Ash Dust Control

Bulletin V-100 introduces the Verticone conditioner for fly ash dust control or for unloading of dusty materials from bins and silos. The Verticone also provides first practical means of dust-free unloading of cyclones, bag filters, and electrostatic precipitators. Units available up to 200 tons per hour capacity.
Johnson-March Corporation.

8—Glass-Asbestos Air Filter

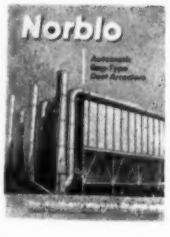
"The Amazing Story of the Absolute Filter," 8-page bulletin 106C, gives ratings for new glass-asbestos medium with efficiency of 99.97% on 0.2 micron particles. Developed from filter originally designed for Atomic Energy Commission and now used for critical air-cleaning problems in industry.
Cambridge Filter Corp.

9—Dry-Type Air Filter

Bulletin B-1300-3 describes the new HP-2 convenient, disposable, dry-type filter for use wherever extra air cleaning efficiency (over 35% atmospheric) is required. Included is chart of performance data, capacity, dimensions, and weights. How to change filter is shown in series of pictures. Other pertinent information.
Farr Company.

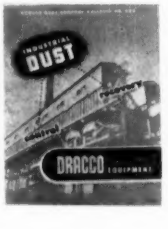
10—Air Recovery Equipment

Twelve-page Dorex bulletin 108 makes available information on the use of Dorex activated carbon air recovery and air purification equipment. Included are equipment selection, application, specifications, and reactivation service. Dorex air recovery equipment is of two basic types – C Cells and Canisters.
Connor Engineering Corporation.



11—Bag-Type Dust Collectors

How the Norblo automatic bag-type dust collector can provide continuous operation at full capacity is explained in four-page folder 164-5. Dimensions and capacities are listed in tabular form. A flow diagram explains how the unit works. Each part of the collector is shown separately with its description.
The Northern Blower Company.

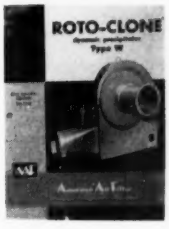


12—Industrial Dust Control

Bulletin 800 contains full technical information on industrial dust control and recovery equipment. Five types of dust filters are described in detail – four bag-type collectors, one cyclone type. Complete specifications for each model within each series are included. Photographs illustrate existing dust control systems.
Dracco Division of Fuller Company.

13—Cyclone Dust Separators

Bulletin sheets describe several models of cyclone dust separators, contain photographs of actual installations, multiple rating tables, specifications, floor space requirements, and dimensional drawings. Sheets are printed in two colors. Explain the use of after-filter where air is to be recirculated.
Torit Manufacturing Company.



14—Dust Precipitators

Bulletin 274B describes Type W Roto-Clone dynamic dust precipitator, featuring water sprays. Gives higher efficiency, delivers collected dust in slurry form for easy disposal. One package — collector, exhauster, motor, and drive. Available in 12 sizes, from 1000 to 50,000 cfm. Performance charts for 4 arrangements.
American Air Filter Co., Inc.

15—High-Velocity Air Filters

New two-page bulletin 130 describes new high-velocity Aerosolve filters which, in comparison with standard Aerosolve filters, provide 80% more air volume per sq ft of face area. Rated face velocity of 450 fpm permits use in high-velocity duct systems without V-ing. Interchangeable cartridges 35%, 85%, 95% efficient.
Cambridge Filter Corp.

16—Centrifugal Dust Collector

Improved design of the Norblo High Efficiency Low Static (H.E.L.S.) centrifugal dust collector includes deep body and improved proportions and does away with dampers frequently used to overcome back pressure, according to 4-page bulletin 104-3. Capacities and dimensions are listed.
The Northern Blower Company.

17—Dust Control Systems

Catalog SJP-1001 describes new Chem-Jet dust control systems for suppression of coal dust at rotary car dumpers, car shakeouts, track hoppers, conveyor transfer points, coal crushers, reclaim hoppers, and coal storage piles. Includes description of new Type A Hydro-Precipitator scrubber.
Johnson-March Corporation.

18—Inertial Dust Collector

Bulletin J-616 describes operation of Joy-Microdyne, a wet inertial dust collector 1/10 size of conventional units. Collection efficiencies of 95% in 5 micron range; 80% in 1 micron range. Twelve-page bulletin details features with cut-aways, performance curves, and installation photographs.
Joy Manufacturing Company.

19—Cyclone Dust Collectors

Data book 4-ATC-1 covers problems of collection of dust from grinding, buffing, cutting, and polishing operations. Describes continuous discharge feature of a small diameter cyclone type tube, and illustrates characteristic efficiency curves for Design 2 and Design 3 tubes. Charts are included.
The Thermix Corporation.

20—Vacuum Cleaning Systems

The Spencer Turbine Company's catalog 160 describes and illustrates installed vacuum cleaning systems for schools, offices, hospitals, hotels, restaurants, clubs, civic, and municipal buildings. Included is a description of the various uses of the system and what satisfied users think of it. Spencer representatives listed.
The Spencer Turbine Company.

21—Air Filters

Bulletin 238 describes 3 types of high efficiency filters. The type F has efficiency up to 99.97% on .3 micron particles. The Multi-Pak and Airmat Deep Red filters have efficiencies from 45 to 99% on atmospheric dust based on media thickness and composition. Media in asbestos cellulose, glass, ceramic fibers.
American Air Filter Co., Inc.

22—Electric Precipitators

Five fundamental engineering factors governing the success of precipitator installations are fully described and illustrated in a 22-page booklet, "Buell SF Electric Precipitators." Factors include positive gas flow control, uniform electrode emission, rapping method, mechanical construction.
Buell Engineering Company, Inc.

AIR CONDITIONING, HEATING, AND VENTILATING

23—Water Chillers

Catalog 81P-5 describes the Arkla water chillers. Offered with capacity modulation for economy of operation results. No moving parts offers flexibility of design with regard to low floor loading and vibrationless operation. Catalog outlines advantages of Arkla absorption-type equipment.
Arkla Air Conditioning Corporation.

24—Zone Control Cabinets

New 20-page bulletin AC-220 gives complete information on Type PCB Zone Control air conditioning cabinets. For use where several zones require heating, ventilating, and air conditioning in varying degrees. Illustrated bulletin covers construction features, physical data, dimensions, fan performance, and coil ratings.
Buffalo Forge Company.

25—High-Velocity Valve Attenuators

Bulletin K-33-A describes and illustrates in detail Connor Engineering Corporation's Kno-Draft Series 45 high-velocity valve attenuators. Series 45 components, installation, and duct design information, selection and performance charts for each model are presented. This bulletin consists of 24 pages.
Connor Engineering Corporation.

To order personal copies of these bulletins, please fill out the card between pages 2 and 3 or 42 and 43.

26—High-Velocity Filters

Bulletin B-100-2B describes high-velocity panel impingement filters. Filters are of the permanent, all-metal type and can be restored to their original performance capabilities by cleaning and recoiling. High-velocity filters have 50% greater capacity than throw-away units (1200 cfm vs. 800 cfm, 20 x 20 in. filter).
Farr Company.

27—Packaged Air Conditioners

Bulletin RS2C describes packaged air conditioners – water cooled models from 3 through 50 tons capacity, and air cooled models to 7½ hp. Packaged liquid chillers, from 7½ to 100 tons capacity, for F-12 and F-22 refrigerants, are also described. Bulletin includes specifications, dimensions, and photographs.
Curtis Manufacturing Company.

28—Curtain Wall Air Conditioners

Bulletin PW-260 describes a new concept of curtain wall function, room-by-room air conditioning, an integral part of the Lupton curtain wall system. This is a true perimeter type system affording individual room control. It is a space saver and is easily installed. Includes capacities, dimensions, and specifications.
Michael Flynn Manufacturing Company.

29—Radiant Panel Heating

"Radiant Panel Heating with Steel Pipe," 48 pages, covers the history of this type of heating, basic design, floor, ceiling, and wall panels, information on snow melting systems, pipe coil integration, design of a floor coil system, and a boiler hook-up diagram.
Committee on Steel Pipe Research, American Iron and Steel Institute.

30—Shell and Tube Condensers

Described and illustrated in the new Dunham-Bush 16-page catalog are the Heat-X 'CSTC' cleanable shell and tube condensers – heavy duty, high capacity condensers. Construction details, dimensions, selection data, and performance charts are included.
Heat-X, Inc., a subsidiary of Dunham-Bush, Inc.

31—Roof Ventilators

New catalog 59 describes the many standard types of power and gravity roof ventilators featuring AMCA certified ratings for Statick power ventilators. Nearly all the standard items shown are subject to considerable modification to meet your special conditions with suggestions gladly offered at any time.
Hirschman-Pohle Co., Inc.

32—Packaged Boilers

Twelve-page catalog describes type AS Superior packaged boilers for capacities as low as 4000 lbs steam per hour. Complete with rotary burners, integrated controls, soot blowers, refractory, and insulation, these units also have quiet rear mounted draft fans which provide air cooling of furnace floor.
Superior Combustion Industries, Inc.

33—Control of Air Properties

Bulletin 122, 8 pp., illustrated, describes methods to obtain control of air properties with accuracy of 1% in R.H. and 1 F in temperature (up to 140 F dew point) with compact high capacity apparatus for industrial applications. It is entirely independent of the use of moisture-sensitive instruments.
Niagara Blower Company.

34—Air Conditioning Equipment

Engineering catalog with illustrative and descriptive information and complete selection data on central plant conditioners, multizone conditioners, sprayed coil units, heating-ventilating units, cooling and heating coils. This catalog is notebook type and is index tabbed for easy and quick use.
Thermal Engineering Corp.

35—Roof Ventilators

Bulletin CAM-3 describes Swartwout Airmovers, which act in a double capacity, that of high capacity gravity roof ventilators and skylights. Included are cutaway photographs showing construction, capacity tables, and installation instructions. One section shows how to calculate illuminating capacities.
The Swartwout Company.

36—Turbulator Units

Air-conditioning consultants and building managers will be interested in the new line of turbulators for zone control of air conditioned buildings. Anemostat turbulators are high-capacity 800 to 7000 cfm units with special air valves and mixing vanes built as a package, for installation in a high-velocity system.
Anemostat Corporation of America.

37—Refrigeration Condensers

Engineering data on a complete range of sizes and types of condensers for ammonia and Freon refrigerants are given in 40-page bulletin RC-2, "Refrigeration Condensers." Closed, horizontal multipass types, and open, vertical single-pass types are featured. Piping sizes and temperature tables also are included.
Henry Vogt Machine Co.

38—Power Roof Exhausters

Bulletin BDS-6 contains full descriptive material on Gallaher Series 5 belt driven Air-Van power roof exhausters. Included in bulletin are rating tables, dimensional tables, material specifications, and curb details. Units have capacities from 3000 to 65,000 cfm and will handle static pressures to 4 inches.
The Gallaher Company.

39—Fan Unit Heaters

Catalog 46-94 presents complete data on 4-Way, horizontal and vertical projection propeller fan unit heaters. Ratings, physical data, and specifications cover all sizes of the three basic styles to guide consulting engineers. Information on piping and electrical details is included to facilitate unit installation.
Carrier Corporation.

40—Hermetic Compressor Units

Catalog EM59-2052 describes York's internally compounded hermetic compressor units. Charted comparison shows difference between conventional and internal units. Shows rating, selection, application data, and is illustrated with graphs. Gives physical data, roughing-in dimensions, and wiring diagram.
York Corp., Sub. of Borg-Warner Corp.

41—Space Heaters

Bulletin A1/2.1a describes the newly redesigned line of heavy duty space heaters for gas, oil, or dual fuel firing. The line includes 10 sizes of heaters, 400,000 to 2,000,000 Btu; all can be installed for up-flow, down-flow, or horizontal discharge and can be used with or without ducts. Bulletin gives all data.
Reznor Manufacturing Company.

42—Central Air Conditioning

Catalog 7558 gives performance, capacity, and dimensional data required to select proper size unit for given installations as well as selection example. Capacities range from 700 cfm to 28,000 cfm. Horizontal and vertical arrangements offered in 10 sizes – multizone units in 9 sizes, selection of 2 to 21 zones.
Young Radiator Company.

43—Unit Ventilators

New unit ventilator control application loose-leaf file describes in detail control cycles for all leading types and models of unit ventilators. The booklet includes new face and by-pass units, and incorporates complete set of specifications and diagrammatic drawings for each. Tab permits easy reference in file.
Barber-Colman Company.

44—"Comfort Curtain" System

Attractive 28-page booklet with photographs and color keyed drawings completely explains Comfort Curtain system of heating, ventilating, and air conditioning schools, offices, churches, and large commercial buildings. Individual classroom or central heating type installations, air conditioning optional.
Lennox Industries, Inc.

45—Roof Ventilators

Bulletin SPV-101-G contains design, structural features, performance, and dimension data for Burt's complete line of power and gravity ventilators and automatic wall louvers. Burt axial flow airfoil fans, fan motor housings, motors, bases, dampers, and controls are also detailed in this complete catalog.
The Burt Manufacturing Company.

46—Pressure Reducing Valve

Catalog 113, 24 pages, covers type PRV pressure reducing valve for high and low pressure air distribution systems. Detail dimension drawings, plus complete tables and graphs on sound are included. Tables and drawings given for the acoustic duct lining. List prices are given for each size.
Tuttle and Bailey Div.,
Allied Thermal Corporation.

47—All-Aluminum Ventilators

Twenty-page technical manual contains helpful information in planming ventilation for commercial, industrial, school, and institutional buildings. Lists a complete line of low-silhouette, all-aluminum ventilators in capacities to 38,350 cfm. Also includes a new prefabricated curb for roof ventilators.
The Loren Cook Co.

48—Air Outlets

New 20-page catalog contains complete engineering and performance data in table form for sizing and selecting Thermotank round and drum type punkah louvers. Dimensions, typical installations, and suggested applications for these air outlets, plus other data of value to the consulting engineer also included.
Air Devices Inc.

49—Evaporative Condensers

Bulletin 50 describes line of Marlo evaporative condensers, in three types – horizontal, vertical, low silhouette – 20 sizes, capacities 3 to 250 tons. Bulletin includes photographs, drawings, construction features, performance charts, ratings, and specifications. Additional data also is included in this 24-page bulletin.
Marlo Coil Company.

50—Roof Ventilators

Bulletin A-112, 16 pages, gives descriptions, specifications, dimensions, and performance data on the complete line of Hartzell roof ventilators, including the new reversible model, two vertical discharge models (Vertijet and Airjet), and a fan-powered rotary ventilator. Data on penthouses are included.
Hartzell Propeller Fan Company.

51—Air-Cooled Condensers

New six-page bulletin U-391 entitled "Kramer Unicon for Unlimited Tonnage" describes operation and application of Unicon, the original remote type air-cooled condenser for air conditioning and refrigeration equipment of any tonnage. Dimensions and selection tables also are included in bulletin.
Kramer Trenton Company.

52—High-Velocity Air Conditioning

Four-page bulletin 1312 covers the Hi-Static Multitherm unit, developed principally for high-velocity, conduit type air conditioning systems. Available in seven sizes, covering a volume range of about 2500 through 22,000 cfm, and suitable for systems with a static pressure of 8-in. wg maximum. Specifications.
Clarage Fan Co.

53—Ventilation Noise Control

"Controlling Ventilation Noises" is a comprehensive brochure on ventilation noise control research performed at Armour Research Foundation. It gives engineering information in tables to enable you to predict accurately the noise level of a DeBothezat fan.
DeBothezat Fans Division,
American Machine & Metals, Inc.

54—Cleanable Cooling Coils

Bulletin R-50 describes and illustrates Aerofin type R removable-header water coils. These are cleanable-tube extended-surface coils for cooling air with water. Principal advantages are easy cleaning of tubes and positive drainage. Engineering data for various pass arrangements are given to assist in selection.
Aerofin Corporation.

55—Cabinet Heaters

Publication 463-1 completely describes the Nesbitt series A cabinet heater. This catalog gives in concise form the complete features of construction, available arrangements, steam and hot water capacities, selection data, piping diagrams, details, and dimensions of this attractively styled, high capacity cabinet unit heater.
John J. Nesbitt, Inc.

56—Evaporative Water Coolers

Catalog 35C8a describes 13 sizes of "Dri-Fan" closed circuit evaporative water coolers covering systems up to 3 million Btu removal. Included in this catalog are informative fan and pump data, load multipliers, head loss, performance, booster capacity. Dimensions and arrangements also are listed.
Recold Corporation.

57—Industrial Fans

Bulletin 585 describes newly designed general industrial fans incorporating advanced aerodynamic techniques. The new fan combines improved efficiency with all the advantages of the flat radial blade design. Three wheel types are offered; diameters from 10 to 78 inches; capacities from 203 to 72,865 cfm.
The New York Blower Company.

58—Power Roof Exhausters

Bulletin 58-HA describes the new addition of the all-aluminum belt-driven Hi-D axial power roof exhauster. Available in 24 models in capacity ranges from 3330 cfm to 28,650 cfm and equipped with totally enclosed ball-bearing motors and full ball-bearing tubular drive assembly.
Jenn-Air Products Company, Inc.

59—Direct-Drive Blowers

Peerless Electric catalog 215 deals with AMCA-rated nonoverloading Class 1 direct-drive blowers. General construction data, ratings, motor specifications, performance data, dimensions, and recommended specifications are included. Extra features also are discussed.
The Peerless Electric Co.,
Fan and Blower Division.

60—Indirect Water Heaters

Application, selection, and installation of indirect water heaters are detailed in bulletin IW-34. Indirect water heating furnishes hot water the year around from the same boiler that also provides for space heating or process work. A large hot water tank is not required and the initial cost is usually less.
Bell & Gossett Company.

61—Spiral Air Duct

This 8-page bulletin describes "Lock-seam" high-velocity, spiral air duct. Produced as a continuous conduit, it is available in any length, diameters from 3 to 22 in. Included are specifications, various types and gage of metals available, drawings of various types of fittings, and suggested uses.
United Sheet Metal Co., Inc.

62—Roof Ventilators

New 16-page Colt catalog describes clear opening "CO" ventilators. Fit any type of roof for quick release of concentrated process heat – with special attention to fire control through use of automatic fusible link louvers. Specific installation instructions included. Catalog also available on "GP2" inlet ventilators.
Colt Ventilation of America, Inc.

63—Reinforced Plastic Parts

Maintenance-free Duracor resists practically any acid, fume, or gas. Strong, lightweight units requiring minimum support also offer integral resistance to heat or flame. Hoods, ducts, elbows, and other parts can be either supplied from stock or fabricated to individual customer specifications.
The Ceilcote Company, Inc.

64—Gas-Fired Air Make-Up Units

Bulletin 870 illustrates and describes new gas-fired air make-up units for natural, mixed, manufactured, and propane gases. Four unit arrangements in four sizes from 36 to 54 in. for various capacities, Btu ratings, and pressure conditions. Self contained package for easy installation. Safe, dependable operation.
Aerovent Fan Co., Inc.

65—Air Conditioners

New 12-page bulletin 9327 describes the new line of Diaflo air conditioners. Features of the new units are outlined and the various enclosures are described and illustrated. Detailed descriptions are included for all major components. Cooling ratings 200, 300, 400, and 600 cfm.
American-Standard,
American Blower Division.

66—Cooling Coils

Bulletin 880 describes the complete line of Herman Nelson cooling coils. Includes over 20 photographs, construction specifications, dimensional data, surface charts, circuiting diagrams. Capacity rating tables, sample selection problems are given for direct expansion coils and both standard and cleanable water coils.
American Air Filter Co., Inc.

67—Packaged Air Conditioners

Catalog 570 describes a new line of packaged air conditioners. Models include single and dual compressor with evaporative condenser or cooling tower. Evaporative condenser may be integral or remote. Sizes from 20 through 60 tons. Matched heating coils available. Dimensions, specifications are listed.
Acme Industries, Inc.

68—Refrigeration Tables

Latest thermodynamic tables on "Genetron" 12 (dichlorodifluoromethane, the most widely used fluorinated hydrocarbon refrigerant). Best available data; electronically computed. This issue is the third in the series – tables on Genetron® 11 and 22 were released earlier.
General Chemical Division,
Allied Chemical Corporation.

69—Tubeaxial Fans

Bulletin 620 illustrates and describes Type BT and BTV belt driven tubeaxial fans for handling corrosive fumes, high temperatures, explosive fumes, abrasive dusts, dirt laden air, and high humidity. Drawings are shown for totally enclosed, corrosion resistant, and ventilated assemblies. Ratings and sizes chart.
Robbins & Myers, Inc., Propellair Div.

70—Roof Ventilators

Bulletin PV-1 describes "Wingjet" ventilators. These provide straight-through exhaust from ducts or open areas within the building and can be mounted on all roofs. Details, including cross-sections, given for Type C (for uncontaminated air) and Type B (polluted air). Tables show capacities for 60 different sizes.
L. J. Wing Manufacturing Co.

71—Roof and Wall Ventilators

Attractive 12-page illustrated bulletin DMXA-88 contains complete information on the entire line of Domex roof and wall exhausters. Illustrations, capacity tables, and dimensional data are furnished for convenient selection. Basic instruction features reveal direct air discharge design, spun scroll inlets.
Penn Ventilator Co., Inc.

72—Cooling Towers

Towers For Industry – bulletin 4.9.080A – discusses the structural and mechanical features of Pritchard induced draft, counter flow cooling towers. Drawings include cross-sections, a cutaway, and other detailed drawings. Photographs accompany drawings of most features. Dimensional diagrams are shown.
J. F. Pritchard & Co. of California.

73—Mechanical Draft Fans

Catalog 1361, titled "Heavy Duty Mechanical Draft Fans," describes the series 7000 centrifugal fans, which are designed for handling abrasive gases at elevated temperatures. Complete application, performance, and physical data. Optional accessories are listed.
Westinghouse Electric Corporation,
Sturtevant Division.

74—Wall and Roof Exhausters

This sixteen-page catalog covers Ammerman's AirXpeler. Catalog is divided into four sections. Section A discusses exhausters—wall or roof mounted, direct driven; Section B, exhausters – roof mounted, power operated and belt driven; Section C, dampers—back pressure, shutters, and louvers; Section D, fans.
Ammerman Company, Inc.

75—Condensation Units

In bulletin 425, tables and drawings show performance and dimensions of American-Marsh Junior Redi-Return condensation units in two basic sizes. Size No. 1 handles up to 5000 square feet EDR at 20 lbs. discharge pressure. Size No. 2, up to 9000 square feet at 30 lbs. Bronze fitted pump, copper bearing steel tank.
American-Marsh Pumps, Inc.

To order personal copies of these bulletins, please fill out the card between pages 2 and 3 or 42 and 43.

76—Adjustable Pitch Fans

Bulletin A-111 describes adjustable pitch fans for heat exchanger and cooling tower use and for mine ventilation. Line includes 14- and 22-ft models with formed Hartzite plastics or plastics-impregnated wood blades, 10- to 14-ft models with molded plastic blades, and 40- to 120-in. all-aluminum type fans.
Hartzell Propeller Fan Company.

77—"Thermobank" Compressor

New illustrated 16-page catalog R450 on refrigeration and air conditioning units. Includes new Kramer Thermobank Compressor and new Cub Curvette. Enlarged sections on Unicon air cooled condensers, Winterstat pressure control system, and Thermobank automatic defrost system. Contains detailed rapid selection tables.
Kramer Trenton Company.

78—Multi-Zone Air Conditioner

Herman Nelson Multi-Zone units are of sectionalized construction; offered in 8 sizes; handle from 2 to 8 zones; air capacity 3400 to 36,000 cfm. Bulletin describes such features as Roll-O-Vent automatic filter section, dampers, humidifiers, mixing boxes. Complete capacity and specification data are included.
American Air Filter Co., Inc.

79—Draft Inducers

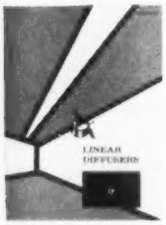
Bulletin I-57 describes draft inducers for heating boilers and power plants, ranging from small domestic and commercial heating units to those for boilers up to 120,000 lbs. per hr. Packaged design units are factory assembled, with air-cooled fan bearings and interchangeable inlet panels. Motor, turbine, or dual drive.
L. J. Wing Manufacturing Co.

80—Air Make-Up Unit

A new air make-up unit designed to temper outside air and supply it in sufficient quantities to eliminate negative pressures is described in bulletin 850. Make-up air units are available in seven unit arrangements in six sizes from 24 to 54 inches, with air capacities ranging from 4000 to 33,000 cfm.
Aerovent Fan Co., Inc.

81—Remote Air Conditioning Units

Bulletin 3355 describes Marlo Seazonaire remote room air conditioning units for multi-room installations, available in six standard types, floor or ceiling mounted, finished cabinet or recessed, capacities from 210 to 1260 cfm. Included are construction details, specifications, and installation dimensional drawings.
Marlo Coil Company.



82—Linear Diffusers

One- and two-way blow linear diffusers are discussed in new 12-page catalog 114. Tables are given for 3½-in., 6½-in., 7-in., and 13-in. Listed size, performance data, and engineering data are given. Includes list prices for linear diffusers and linear dampers. Specifications also are included.
Tuttle and Bailey Div.,
Allied Thermal Corporation.

83—High-Velocity Systems Manual

Thermotank-Agitair 52-page manual contains complete engineering and performance data in table form for standard and constant volume perimeter and ceiling units. Dimension drawings, duct design, typical system layouts, installations, laboratory facilities, and other helpful engineering information included.
Air Devices Inc.

84—Power Ventilators

Designed to serve with equal efficiency as exhaust or fresh air supply units, Burt low type power ventilators are detailed in bulletin SPV-16. Structural, design, dimension, and performance data are included for these high capacity, low profile ventilators. Available with either direct motor driven fan or belt drive.
The Burt Manufacturing Company.

85—Constant Volume Regulator

Stabilization of high-velocity systems is simplified with the new double duct mixing unit with self-contained constant volume control which is now available from Barber-Colman Co. Temperature control and volume regulation are treated as separate functions—operation of one cannot adversely affect the other.
Barber-Colman Company.

86—Gravity Ventilators

Colt catalog, 20 pages, describes new line of "SR" and "O/SR" gravity ventilators. Special airfoil shape increases velocity of extraction. Weatherproof, adjustable center gives reserve extraction ability for exceptionally hot days, is unique in gravity ventilators. Catalog fully illustrates and details new line.
Colt Ventilation of America, Inc.

87—Belt-Driven Fans

Bulletin 740 describes and illustrates Type CB belt-driven, quiet operating fans for use wherever large volumes of air must be moved at low noise levels and moderate pressures. Includes performance data and dimensions for fans from 42-inch to 72-inch with air deliveries to 58,100 cfm.
Robbins & Myers, Inc., Propellair Div.

88—High-Velocity Pipe Fittings

Two-color "Laminar-Flo" bulletin describes die-stamped two-piece 90° elbows in 3 to 8 in. diameters. Low loss fittings ideal for high-velocity systems. Bulletin contains chart and table of static pressure losses in various diameters and a table of specifications. Spiral Lockseam pipe is also described.
United Sheet Metal Co., Inc.

89—Cooling Towers

"LoLine" cooling towers for air conditioning, industrial service are detailed in this new 16-page bulletin, 5.1.902, Rev. 4. Available in two heights, units have low silhouette, high performance, attractive appearance. Literature contains engineering data, dimensional drawings, specifications, tables for both series.
J. F. Pritchard & Co. of California.

90—Bifurcator Fans

Catalog DB-37-55, 16 pages, describes operation of the bifurcator fan, a split-housing fan that exhausts hot, corrosive, and flammable fumes. Use of the bulletin makes fan selection easy since it gives full data on fan laws and static pressure, velocity pressure and friction.
De Bothezat Fans, A Div. of
American Machine & Metals, Inc.

91—Air Conditioning

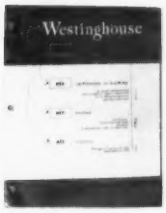
A complete line of air conditioning and refrigeration equipment is listed in bulletin EX-1258. Package units and components are both described as well as pumps for circulation and transfer work. Equipment ranges in size from 7½ to 150 tons and design is modern and efficient. Bulletin is well illustrated.
Bell & Gossett Company.

92—Pneumatically Controlled Units

Bulletin 507 describes Armstrong pneumatically controlled units for humidifying anaesthetic gas areas in modern hospitals. Contains tables for determining humidification load from cfm capacity of duct. Illustrated with diagramistic drawings of units. Shows typical installations and gives price data.
Armstrong Machine Works.

93—Packaged Industrial Fans

New bulletin 586 describes packaged industrial fans with radial flat blade wheels. Available in sizes 141 through 361. Economically designed, they feature one-man motor installation and removal. Motor and belt pull are on vertical centerline. They are easily rotatable or reversible in the field.
The New York Blower Company.



94—Air Distribution

"Westinghouse Puts Air To Work" is a new booklet which covers the treatment and distribution of air and the products to do the job. This booklet is well illustrated and has sections on air handling, air conditioning, air heating, and electronic air cleaning.
Westinghouse Electric Corporation, Sturtevant Division.

95—Air Conditioning Units

Catalog 7758 gives full information on remote type Roomaire Conditioners. Units available in capacities of 200 cfm through 600 cfm. Roomaire units provide year around conditioning of air: cool, heat, dehumidify, or circulate air. Complete sizing, performance, and capacity data are included in catalog.
Young Radiator Company.

96—Industrial Heating Equipment

Bulletin A1/1.2A covers a complete line of gas-fired commercial and industrial heating equipment with capacities from 25,000 to 2,000,000 Btu. Includes fan and blower type suspended unit heaters, heavy duty space heaters, and sectional duct furnaces with matching cabinet blowers. Dimensions, specifications.
Reznor Manufacturing Company.

97—Packaged Water Chillers

Acme Model DE Flow Therm packaged water chillers are described in new catalog 534. Units feature dramatic reduction in size and weight, as much as 50% over previous models. Compressor is direct drive. Capacities range from 20 through 125 tons. Dimensions, specifications, and application data are included.
Acme Industries, Inc.

98—Roof Exhausters

Completely new 4-page bulletin SC-88 describes in detail the original acoustically insulated Sonotrol curl. Dimensional charts for standard Domex and Dynafan roof exhauster sizes are listed along with drawings for flat or single pitched installation. Offers information on other factory fabricated curbs.
Penn Ventilator Co., Inc.

99—Packaged Steam Generators

Bulletin VWA illustrates and describes a series of 10 packaged water tube steam generators with capacities from 1500 to 20,000 pounds of steam per hour. Includes details of construction, testing, and over-all dimensions. Units may be fired with factory installed gas, oil, or combination Webster burners.
The Webster Engineering Company.

100—Fan Manual

Catalog 221, 92 pages, presents comprehensive data on Clarage Type NH fans. Information is conveniently arranged to enable engineers, designers, and architects to select readily the proper fan equipment to meet specific air handling and conditioning requirements. Charts, tables, and graphs are included.
Clarage Fan Co.

101—High-Velocity Air Valve

Simple, positive control of velocities and pressures with linear control of air volume is provided by a new high-velocity air valve. Composed of gang-operated neoprene vane sections, it has a variety of applications in both single and double duct installations. Complete information is contained in a new catalog, F-8752.
Barber-Colman Company.

102—Duct Furnaces

Catalog 46TD95 provides complete details on 11 duct furnaces ranging in size from 50,000 up to 440,000 Btuh input, and data covering companion engineered blower assemblies designed for use with the duct furnaces. Ratings, performance, physical data, and specifications are included with tips on furnace installation.
Carrier Corporation.

103—Space Heaters

Twelve-page bulletin describes OG-4 new design space heater. Gas, oil, or combination dual fuel burners with push-button changeover. Output from 280,000 Btuh on up. Rugged construction with completely enclosed burner adaptable for space heating, ventilation, make-up air, process heating, air conditioning.
Lennox Industries Inc.

104—Water Chillers

Catalog EM-235 describes the York lithium bromide absorption system which automatically chills water for air conditioning and process refrigeration. A diagram in six colors, one for each element, shows how the system works and the relative position of the various elements comprising the system.
York Corp., Sub. of Borg-Warner Corp.

105—Power Roof Exhausters

Catalog gives full details on new Super Air-Van line of power roof exhausters in reinforced Fiberglas, including features, rating tables, dimension tables, and specification data. Physical and chemical advantages of Fiberglas units are discussed. These include quietness, corrosion resistance, strength, light weight.
The Gallaher Company.

106—High Velocity Ducts

Special 24-page manual contains 11 pages of performance tables; explains step-by-step computations on two work sheets for 10-story office building; shows schematic layouts; information on duct construction and duct insulation. Also included are tables of static regain and transition loss and elbow losses.
Anemostat Corporation of America.

107—Power Roof Exhausters

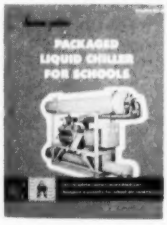
Bulletin 58-HC illustrates features of new Jenn-Air Hi-^{D} centrifugal belt drive all-aluminum power roof exhausters. Offered in 46 sizes with capacity ranges from 1085 cfm to 21,400 cfm featuring ball-bearing totally enclosed motors and full ball-bearing tubular drive assemblies. Bulletin is illustrated.
Jenn-Air Products Company, Inc.

110—Evaporative Condensers

New catalog 30C8c describes 36 sizes of "Dri-Fan" evaporative condensers, from 5 to 233 tons. Selection data for refrigerant 12, 22, and ammonia; multi-circuits on Freon condensers; ammonia oil separators; dimensional data and arrangements are also covered in this catalog.
Recold Corporation.

108—Automatic Boilers

Four-page bulletin includes complete specifications and dimensions for 17 models of automatic boilers from 20 to 600 hp. Design and construction are in strict conformance with ASME boiler and pressure vessel code. High pressure mechanical atomizing nozzle-mix oil/gas burner provides efficient combustion.
Boiler Engineering & Supply Co., Inc.



111—Packaged Liquid Chillers

Bulletin 675-A1 describes Herman Nelson packaged liquid chiller for schools. Simple to operate, efficient, easy to maintain. Features safety-interlocked control panel. DX chiller solves problem of low coefficient of heat transfer on refrigerant side. Complete capacity tables, application data given.
American Air Filter Co., Inc.

109—Centrifugal Roof Ventilators

Bulletin SDA-220 deals with the Peerless belt and direct drive centrifugal roof ventilators which have recently been added to the Peerless roof ventilator line. Features, construction details, performance data, dimensions, and specifications are presented.
The Peerless Electric Co., Fan and Blower Division.

112—Electric Cabinet Heaters

Publication E-403 describes the completely new Nesbitt series E electric cabinet heater. A versatile, high capacity unit, it is styled with durable, good appearance for life-long beauty and trouble-free operation. Exclusive features provide completely safe operation and prevent overheating under all conditions.
John J. Nesbitt, Inc.

ELECTRICAL EQUIPMENT

113—Electric Controls

Engineering reference catalog 18A contains a complete line of standard Zenith electric controls and timing devices. Photos, diagrams, engineering data, and prices on automatic transfer switches, magnetic contactors, remote control switches, program clocks, automatic reset timers, cycle timers, and special controls.
Zenith Electric Company.

116—Motor Insulation

"Specify Silicone Insulated Motors and Transformers and Save" is the title of this eight-page brochure. It describes motors giving improved reliability, lower initial costs, and transformers offering real savings in installation time and space. Some silicone insulated equipment available is illustrated.
Dow Corning Corporation.

114—Open Motors

Super-Seal open motors, bulletin 05-51B9040, can be used in applications formerly requiring TEFC designs. Savings are up to 60 percent. In any integral hp size, their superiority results from revolutionary new insulations. Motors with both epoxy-resin encapsulated stators and *Silco-Flex* insulated stators.
Allis-Chalmers, General Products Div.

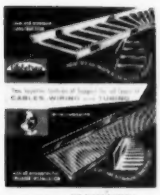
117—Wire and Cable

"Wire & Cable for American Industry," 72-page catalog, gives construction specifications for all types of wire and cable, such as: apparatus, appliance, audio, boiler room, building, coaxial, control, gasoline resistant, instrument, mining, power, railway signal, remote control, sheet lighting, and many other types.
Continental Wire Corporation.

115—Reelites

Bulletin 504 is a 50-page brochure describing an Appleton specialty, Appleton "Reelites." The "Reelites" are especially designed to automatically take up electric cable. "Reelites" range from small portable types to heavy industrial motor driven units. Catalog covers full line of Appleton "Reelites."
Appleton Electric Co.

118—Panelboard Circuit Breaker

Bulletin 3103 covers the Heinemann series 0911, an economical panelboard circuit breaker dimensionally interchangeable with other makes. Available in 1- and 2-pole models, 0.050 to 60 amperes, the 0911 uses hydraulic-magnetic actuation to end heat-induced nuisance tripping. Fast short-circuit interruption.
Heinemann Electric Co.

119—Cable, Wiring, and Tubing

Two systems of support for all types of cable, wiring, and tubing are described in a 28-page illustrated catalog. Systems are engineered to be used interchangeably, depending on the weight of the load to be supported at any location. Globetray, the ladder-type tray, and cable-strut, the basket type, described.
The Globe Company.

120—Enclosed Conductor Systems

Catalog 8-58, newly revised, describes Insul-8-Bar enclosed conductor systems for cranes, monorails, moving machinery. Contains complete engineering data, illustrated parts list, installation instructions. System capacities are 90 to 500 amperes. Standard catalog parts meet all installation and operation requirements.
Insul-8-Corporation.

121—Metal-Clad Switchgear

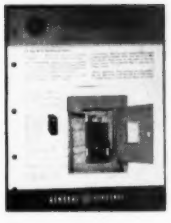
This newly published brochure by S & C Electric Company on the subject of metal-clad switchgear contains numerous photographs and one-line diagrams of many typical S & C switchgear units for industrial high voltage power distribution. Sizes from 2.4 kv through 34.5 kv are available.
S & C Electric Company.

122—Power Cables

Catalog J-942 describes a new development consisting of three single conductor, parallel-laid, insulated, 5 kv power cables, supported from a messenger by a plastic spacer. Method combines the advantages of both open wire lines and insulated cables. Data on design, operation, installation, splicing, and tapping.
John A. Roebling's Sons Corporation.

123—Pushbuttons

This complete guide, B-6749A, contains illustrations, application data, dimensions, prices, and circuit wiring information on a complete line of Westinghouse pushbuttons. Included are Oil-tite, standard-duty, and heavy-duty pushbuttons and enclosures, as well as accessories for all units in this 80-page booklet.
Westinghouse Electric Corporation.



124—Panelboards

Bulletin 1257A consists of 4 pages and describes General Electric's Type NLTQ Panelboard line (both assembled and unassembled). Bulletin covers application data, ratings, weights, dimensions, as well as pictorial description. Factory-assembled panelboards are available in a number of modifications.
General Electric Company.

125—Induction Motors

Bulletin MU-220 describes fractional and integral horsepower single-phase repulsion-start induction motors with high starting torque and low starting current, suitable for applications with extra heavy starting requirements. Contains comparison graph charts, cutaway picture of motor, ratings, and dimensions.
Wagner Electric Corporation.

126—Fuseholders

New Buss fuse-fuseholder combination for protection of individual fluorescent fixtures and other equipment on circuits of 300 volts or less. Bulletin SFH-6 tells how individual fusing reduces hazards of fires and explosions. Bulletin specifies the size fuse to use and where to locate it for the best protection.
Bussmann Mfg. Div., McGraw-Edison Co.

127—Rubber-Insulated Power Cables

This 40-page bulletin gives a full description of Anaconda's complete line of rubber-insulated power cables. Constructions range from 600 to 15,000 volts and every type of dimensional data is furnished in this booklet. Also included are ampacity and installation data, as well as instructions on how to order.
Anaconda Wire & Cable Company.

128—Weatherproof Wires and Cables

Catalog W-1-58 includes conductor data on these cables with aluminum, ACSR, bronze, copper, and copperweld conductors; current carrying capacities, and American Standard Specifications C8.34-1954, C8.35-1957, and tentative revision C8.18-1948 covering weather-resistant neoprene, polyethylene, and URC types.
General Cable Corporation.

129—Centralized Electrical Controls

Catalog SM-244, 16 pages, describes in detail the modern method for centralizing electrical power distribution and motor control equipment for industrial applications. It also contains suggested ideas for control specifications, and gives a simplified selector for use in control center layout and planning.
Square D Company.

130—Dry-Type Transformers

This bulletin 958 describes and illustrates Sorgel Electric Company's standard line of low sound level dry-type transformers in ratings of ¼ to 3333 kva single phase and 1 to 10,000 kva three phase, 120 to 15,000 volts suitable for varied installations. Consultants will find the book valuable.
Sorgel Electric Company.

To order personal copies of these bulletins, please fill out the card between pages 2 and 3 or 42 and 43.

131—Bus Duct Systems

Bulletin BD-750 contains the basic descriptive information regarding the manufacture, design, and performance of BullDog BUStribution duct systems. Both the LO-X Feeder and the Plug-In bus duct systems are covered in the completely illustrated 16-page brochure. Bulletin of value to the consultant.
BullDog Electric Products Company.

132—Centralized Circuit Control

This descriptive 52-page bulletin, 32-250, covers centralized circuit control and protection for generators, motors, bus, and feeders up to 13.8 kv. A complete line of functional units available as standardized assemblies in any combination to meet specific requirements. Includes outstanding design features of this unit.
Westinghouse Electric Corporation.

133—Interchangeable Wiring Devices

Illustrated 6-page bulletin 2940 details full range of P&S Despard devices. Features full line of outlets including 3-wire grounding type, pressure terminal devices, and switches for all installations including luminous Roto-Glo Quiet Switch, and various combinations of outlets and switches.
Pass & Seymour, Inc.

134—Interrupter Switches

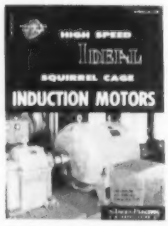
Bulletin 1610A, 24 pages, describes and illustrates arc-chute type interrupter switches, fused and unfused, for switching feeder circuits. Usually metal enclosed, switch can be wall mounted, free standing, or grouped with common bus. Switches can close in on moderate faults.
R & IE Equipment Division,
I-T-E Circuit Breaker Company.

135—Insulated Cables

New bulletin 1028 contains information on Anhydrex insulated cables for power transmission, control, and communications circuits operating up to 2000 volts. Protective coverings include neoprene, PVC (Plastex), interlocked armor (Condex), lead, and the new impermeable, flexible metallic sheath (C-L-X).
Simplex Wire & Cable Company.

136—Power and Lighting Transformers

Bulletin 200 contains complete information about Hevi-Duty three-phase dry-type power and lighting transformers. Sizes range from 6 to 2000 kva. Illustrations, outline drawings, sound levels, capacities, prices, dimensions, weights, wiring diagrams, and temperature rise for each transformer are included.
Hevi-Duty Electric Company.



137—Induction Motors

Bulletin 210 illustrates and describes large, high-speed Ideal squirrel cage induction motors from 100 to 5000 hp at speeds from 514 to 3600 rpm in frames 584 to 11320. Complete description of design and construction with individual photos of sub-assemblies and method of simplified maintenance and servicing.
Ideal Electric & Manufacturing Co.

138—Technical Data Catalog

Illustrated 78-page catalog contains complete sections on technical data, engineering and research facilities, and cost and time studies. Technical data catalog tells the story behind the AMP terminal you specify for your client's requirements. Includes graphs and case studies of actual installations.
AMP, Inc.

139—Miniature Relays

Bulletin 160-1 presents specifications and dimensions of this new line of miniature relays. The entire relay assembly is hermetically sealed in an unusually compact case. Features are: high temperature rating, low power consumption, MIL specification qualifications, and availability for plug-in or solder connections.
Wheelock Signals, Inc.

140—Rigid Steel Conduit

This well illustrated 12-page bulletin describes the exceptional features and advantages of Rome Cable's high quality rigid steel conduit. Included are dimensions and weights of Rome's hot-dipped galvanized conduit, elbows, and couplings. Packaging and delivery are discussed. Rigid sizing charts included.
Rome Cable Corporation.

141—Complete Electrical Line

The BullDog '58 Marketeer, 80 pages, contains pertinent and technical data on BullDog products. Included are: Electrostrip, safety switches, lighting and power panelboards, switchgear assemblies, universal lighting duct, industrial Trol-E-Duct, and BUStribution duct. Comprehensive catalog is fully illustrated.
BullDog Electric Products Company.

142—Secondary Unit Substations

Detailed information on secondary unit substations—complete and compact load distribution centers for indoor or outdoor applications—in bulletin 3104-1A. Gives data and specifications on a large variety of primary devices, transformers, and secondary switchgear offered in I-T-E secondary unit substations.
I-T-E Circuit Breaker Company.

143—Motor Controls

Catalog 7000, 133 pages, gives detailed technical data, dimensions, prices of a full line of motor controls. A new catalog numbering system replaces old style numbers, enables customers to write one-line order because all pertinent information is now found on a single page. Cross-indexed. Includes handy selection guide.
Westinghouse Electric Corporation.

144—Metal-Clad Switchgear

The latest technical information about Federal Pacific's 5 kv 75, 150, and 250 mva, 15kv 150, 250, and 500 mva metal-clad indoor and outdoor switchgear is contained in this new 64-page catalog 3-440. It includes a fully detailed section on dimensions and arrangements, complete construction details.
Federal Pacific Electric Company.

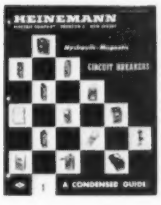
145—Silicone Applications

The 1959 Guide to Dow Corning silicone products gives a graphic picture of the advantages of silicone insulated electrical equipment and related applications. It also describes improved equipment performance gained when silicone parts, dielectric fluids, lubricants, and protective coatings are specified.
Dow Corning Corporation.

146—Panelboard Selection Manual
Booklet 1-125 PCR, Stab-lok handbook for easier panel selection, is published by Federal Pacific. Stab-lok features in enclosures and circuit breakers outlined. Enclosure selector covers load centers, split bus enclosures, and 100 amp. main breaker disconnect. Wiring diagrams cover various applications. Knockout data.
Federal Pacific Electric Company.

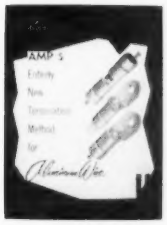
147—Power Circuit Breakers
Twenty-page, two-color bulletin 6004-C provides a complete review of the company's new low-voltage power circuit breakers and switchboards, ranging in unit ratings from 225 to 4000 amperes. Advanced features of the new K-Line breakers, whose ratings are 225, 600, and 1600 amperes, are described.
I-T-E Circuit Breaker Company.

148—Circuit Protection
Newly released 20-page bulletin B-7232, discusses "The Search for Perfection in Circuit Protection." Bulletin also includes complete system protection, science of circuit breaking, solenoid and pneumatic operating mechanisms, oil breakers, arc interruption, and measurement of interrupted current.
Westinghouse Electric Corporation.



149—Circuit Breakers
Bulletin 301, 16 pages, describes operation and application of Heinemann hydraulic-magnetic circuit breakers. It lists a complete line of 1-, 2-, and 3-pole breakers; gives standard current ratings (0.010 to 100 amp.); shows time delay characteristics for branch and motor control circuits.
Heinemann Electric Company.

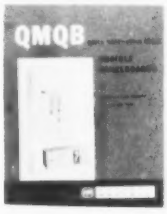
150—Electrical Insulation
Twelve-page, two-color bulletin describes in detail Butyl rubber. Many applications of this rubber that stays "alive" are pictured. Many comparison graphs show effect of heat aging, electrical stability, shock absorption, sound damping, tear resistance, abrasion loss, gas permeability, and low temperature flexibility.
Enjay Company, Inc.



151—Cartridge-Type Terminals
AMP's entirely new termination method for aluminum wire is contained in new 24-page catalog. New "cartridge-type" terminals inhibit oxidation, provide insulation support, reduce effects of cold flow, control heat rise, and assure even current distribution to all wire strands by symmetrical confined crimp design.
AMP, Inc.

152—Vertical Hollow-Shaft Motors
Bulletin 212 covers new line of Ideal vertical hollow-shaft motors from 15 to 125 hp in frames 284 to 505. Includes cutaway showing outstanding construction features, design of noureversing, self-release and rigid couplings, and engineered lubrication and ventilation systems. Specifications and dimensions.
Ideal Electric & Manufacturing Co.

153—Power and Control Cables
This 72-page fully illustrated catalog gives complete information on all types of standard power and control cables manufactured by Rome Cable Corporation. Includes actual example installations, plus charts of data pertinent to selection of proper cables for your application. Also includes standard specifications.
Rome Cable Corporation.



154—Fusible Panelboards
Bulletin 3-230 describes QMQB (quick make-quick break) fusible panelboards for 30 through 1200 amperes, 250 and 600 volts. Cutaway photographs show features of fusible switch units and panelboards. Also included are selection guide for fusible switch units as well as horsepower ratings. Line illustrated.
Federal Pacific Electric Company.

155—Plug-In Busway
Bulletin entitled "Recent Advances in Busway Concepts" covers new concepts recently developed in busway design and construction. The paper is based on General Electric's new type DE (225-1000 amperes) plug-in busway. Contains photographs including cutaway view, busway joints, and fittings.
General Electric Company.

156—Saturable Reactors
Bulletin 658 illustrates and describes Sorgel saturable reactors to control, regulate, and vary electric power from 1 kva to 3000 kva, for various manufacturing processes, either manually or automatically. Also includes a questionnaire form to fill in to obtain complete information for any application.
Sorgel Electric Company.

157—Metalic Sheathed Cables
Bulletin 1031 contains questions and answers on Simplex's new sealed metallic sheathed cables. Simplex C-L-X is a continuous, lightweight, metallic cable sheath which is impervious to gases, chemicals, and water. Its construction, with a thermoplastic covering, gives a combination of unmatched properties.
Simplex Wire & Cable Co.

158—Power Transformers
Extra high voltage power transformers are the subject of 16-page booklet 01B8771. Developments leading up to the newest units are discussed briefly. Test facilities, manufacturing facilities, and testing methods are illustrated. Included are impressive photos of extra high voltage transformers in operation.
Allis-Chalmers Manufacturing Co.

159—Circuit Breakers
Six-page bulletin 3004-A contains descriptive and technical information about the FB line of high speed, current limiting dc circuit breakers. Principal applications of these breakers are for generators, motors, anode protection, and as feeder breakers. Wiring diagrams and outline drawings are included.
I-T-E Circuit Breaker Company.

160—Molded Case Circuit Breakers

Handy 32-page catalog 1-150A describes Federal Pacific's new line of molded case circuit breakers—from the 11/16 in. wide NE-W breaker to the compact, heavy duty 800 A. frame. It is complete with engineering data and reference tables, NEMA and UL specifications, and a type AB breaker selection chart.
Federal Pacific Electric Company.

To order personal copies of these bulletins, please fill out the card between pages 2 and 3 or 42 and 43.

161—Tranfo-Units

Tranfo-Units, indoor or outdoor construction, with ratings of 45 through 3000 kva; primary 2.4 through 14.4 kv; secondary 120/208 through 600 volts. Pre-engineered load centers, for stepping down primary voltages, contain transformer and its primary and secondary distribution devices.
I-T-E Circuit Breaker Co.

162—Indoor and Outdoor Switchgear

Descriptive 32-page bulletin 32-150 outlines indoor and outdoor switchgear utilizing type DB De-ion drawout air circuit breakers . . . for the control and protection of power circuits especially adapted for power centers. Such switchgear widely applied in industrial plants, utility stations, and commercial buildings.
Westinghouse Electric Corporation.

163—Continental Wire Facilities

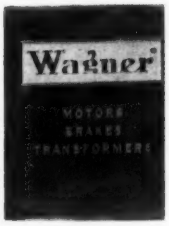
"The Four Minute Tour" is a word and picture trip through the facilities and offices of Continental Wire. It points out some of the machines and operations used to make insulated wire and cable: taping heads, extruder, winder, braiding machinery, carders, varnishing towers, and types of inspection at each point.
Continental Wire Corporation.

164—Circuit Breakers and Enclosures

New 56-page catalog gives fast, full reference on circuit breakers and enclosures, Tranfo-Units, and high voltage switching devices. Prices for unit breakers and their respective enclosures are conveniently grouped by frame sizes. Informative selection charts indicate ratings, overcurrent devices, attachments.
I-T-E Circuit Breaker Company.

165—General Purpose Relays

Bulletin 130-1 describes Wheelock's new plug-in-type general purpose relay. Conservatively rated and compactly designed, this relay meets all UL requirements. Coin silver contacts will handle 20 amperes, 115 volt 60 cycle ac or 24 volt dc. Complete specifications, dimensions, contact arrangements included.
Wheelock Signals, Inc.



166—Complete Electrical Catalog

New loose-leaf and tab indexed catalog describes the complete line of Wagner motors, including engineering information, prices, dimensions, and descriptive material. Covers fractional and integral horsepower single-phase and polyphase squirrel-cage motors in standard open and enclosed models.
Wagner Electric Corporation.

167—Enclosed Circuit Breakers

Catalog 1-155-A describes AB-I enclosed circuit breakers featuring the new plug-in stABreakers. Many features are illustrated. Charted specifications for type AB circuit breakers given. Instruction on how to select circuit breakers for various applications with complete purchasing information is included.
Federal Pacific Electric Company.

168—Mineral Insulated Cable

Brochure S-2 (Rev. 58) has been reissued to include NEC approval for use of this unusual cable in hazardous areas, Class I (Division 1 and 2, Groups C & D) and Classes II and III. MI is offered as a general wiring system suitable for a greater variety of 60C volt applications than any other wiring system.
General Cable Corporation.

169—Plastic Conduit

Descriptive two-color brochure covers four types of plastic conduit for electrical and communications lines (underground or underwater), single or multiple applications. Sizes 2 to 6 in. are featured, with use data, and illustrated assembly methods emphasizing installation cost reductions up to 35%.
Southwestern Plastic Pipe Company.

170—Plastic Cable

This bulletin describes a new all-thermoplastic, 600-volt cable designed for general-purpose and station control requirements of utilities and industrials. Complete information is provided concerning application, construction features, and physical and electrical properties of this cable. Bulletin is illustrated.
Anaconda Wire & Cable Company.

171—Panelboards

Catalog 1-160-A describes Federal Pacific's stABreaker lighting and power distribution panelboards featuring the new plug-in AB circuit breaker. The new breaker cuts space and costs. Step-by-step pictures show installation procedures. Features are shown in cutaway photographs. Knockout, application data.
Federal Pacific Electric Company.

172—Electrical Equipment Catalog

New 20-page manual gives comprehensive specification data on Square D electrical equipment – safety switches, panelboards, switchboards, dimmerboards, control centers, bus duct, and substations. The manual also includes convenient reference guide to National Electric Code requirements.
Square D Company.

173—Circuit Breakers
Bulletin 1604-A. Fully illustrated bulletin covers new K-Line low-voltage power circuit breakers. Breaker is spring operated for quick-make manual or electrical operation. Ratings are 15 through 1600 amperes continuous; 15,000 to 75,000 amperes interrupting. Circuit breakers available for 600-v ac and 250-v dc.
I-T-E Circuit Breaker Company.

174—Dry-Type Transformers
Bulletin 100A contains, in table form, complete statistical information on Hevi-Duty single phase, dry type, insulating transformers, .050 to 500 kva, for power and lighting circuits. Photographs, dimension drawings, capacities, prices, temperature rise, weights, and dimensions are given for each transformer listed.
Hevi-Duty Electric Company.

175—High Capacity Fuses
Bulletin HCS tells how Buss Hi-Cap fuses have unlimited interrupting capacity on any voltage up to 600 to provide safe protection for loads above 600 and up to 5000 amperes. Describes operating characteristics and advantages, illustrates dimensions, contains charts on current limiting effect and opening times.
Bussmann Mfg. Div., McGraw-Edison Co.

176—Electrical Outlets
Sixteen-page booklet, "Electrical Outlets Wherever You Need Them," gives complete details on RLC duct floors, a new development which provides 100 percent electrical flexibility for buildings at a remarkably low cost. The illustrated booklet is published by the Concrete Steel Reinforcing Institute.
Concrete Steel Reinforcing Institute.

177—Wiring Devices
Catalog 60, 75 illustrated pages, describes complete range of electrical wiring devices. Both the interchangeable Despard line and the P&S conventional line. Everything from switches to fixtures to devices for every purpose are listed. A 15-page index and price list are also included in this catalog.
Pass & Seymour, Inc.

178—Bus Duct Layout
Booklet B-4272C is designed for consultants' use in planning and selection of units for bus duct layout in commercial, institutional, and industrial buildings. Plug-in duct, outdoor feeder duct, low-impedance duct, and Life-Line Busway are fully covered. Completely illustrated with engineering and test data.
Westinghouse Electric Corporation.

179—Circuit Breakers
Bulletin 5042-A deals with Cordon current limiting circuit breakers on low-voltage systems, operational characteristic curves, and ratings. Combine proven design and operating features of I-T-E molded case breakers and current limiting Amp-Traps to provide a current limiting circuit breaker in one device.
I-T-E Circuit Breaker Company.

180—Circuit Breaker Systems
Catalog 1-125-R describes and illustrates the Stab-lok circuit breaker system. Covers 3-pole breakers — 15 to 70 amp., 2-pole breakers — 15 to 100 amp., single-pole — 15 to 50 amp. Enclosure selector gives complete information. Load centers for various pieces of equipment in charts and diagrams. Accessories.
Federal Pacific Electric Company.

HEAT EXCHANGERS AND WATER HEATERS

181—Instantaneous Water Heaters
Sims catalog J-1 provides complete engineering data in a condensed form for easy selection of instantaneous water heaters (from 15 to 70,000 gph), booster heaters (from 54 to 6000 gph) and converters (from 2.5 to 1500 gpm). Included in chart form are dimensions, capacities, weights, and prices.
The Sims Company, Inc.

182—Multi-Zone "Platecoil"
Bulletin 159, 48 pages, completely describes new Multi-Zone Platecoil, covering styles, dimensions, specifications, and operational data. Methods of calculating heat transfer equipment requirements are outlined. Typical installations are pictured and described. Available on request.
Tranter Manufacturing Co., Inc.

183—Water Separator Snubbers
B/M "WSS" water separator snubbers are designed to extract 100% of the liquid water from water-sealed vacuum pump exhausts and simultaneously reduce noise of the gas discharge to an ear-comfort level. Used with water for cooling exhaust gases to a safe level where explosive substances are handled.
Burgess-Manning Company.

184—Heat-Transfer Coils
Bulletin S-55 describes new smooth-fin heat-transfer coil construction that permits closer fin spacing, greater capacity per sq ft of face area, and use of higher air velocities without turbulence or excessive friction. It also illustrates many types of extended-surface heat exchangers for heating, cooling, and processing.
Aerofin Corporation.

185—Packaged Boilers

Catalog AD 173, "How to Select a Boiler," offers valuable suggestions to the consulting engineer and the architect on just what to look for when selecting a boiler. For example: first costs vs. operating costs, packaged boiler vs. the built-up boiler, and boiler design standards. Completely illustrated.
Cleaver-Brooks Company.

186—"Thermo-Panel" Coils

Bulletin 355 is a 52-page treatise on Dean Thermo-Panel Coils which "Take The Place Of Pipe Coils." Includes information on construction, specifications, standard types, curved panels, styles of embossings, materials, coatings, pressures, heat transfer, weight, capacity.
Dean Products, Inc.,
Dean Thermo-Panel Coil Division.

187—After Coolers

Bulletin 132 is illustrated with drawings and photographs. Describes self-contained evaporative method of cooling fluids in a closed system, solving water supply and disposal problems, giving close temperature control. The panel casing construction makes the upkeep simple and inexpensive.
Niagara Blower Company.

188—Heat Recovery System

Bulletin 5700-A describes savings in heat and fuel possible with a Cochrane continuous blow-off heat recovery system. Flow diagrams show methods of installation. Contains chart determining savings in pounds/hour when the blow-down, evaporation rate, percentage blow-off, and boiler pressure are known.
The Cochrane Corporation.

189—Hot Water Storage Heaters

Catalog 512 describes the full line of RECO hot water heating equipment. This 20-page catalog includes tables, dimensions, diagrams, and other details for both horizontal and vertical storage heaters. Special linings are indicated. RECO storage heaters are time-proved standbys for providing hot water.
Richmond Engineering Company, Inc.

190—Heat Exchangers

Bulletin HE-6 is a 28-page pictorial presentation of standard and custom built heat exchangers constructed from steel, nonferrous materials, or alloys to meet every temperature, pressure, or vacuum service in conformity to all codes. Features of design are given for each type of heat exchanger.
Henry Vogt Machine Co.

191—Heat Recovery Snubbers

Bulletin 272 describes the Burgess-Manning line of heat recovery snubbers. Heat recovery up to 1500 Btu/bhp/hr can be obtained with a circulating water pump in the system. Standard 2-chamber snubber design plus reduction of gas volume by cooling provides a high degree of silencing.
Burgess-Manning Company.

192—"Platecoil"

This bulletin, 59-PI, describes and illustrates the new Platecoil configuration. It contains pertinent information on construction, application, and advantages in heat transfer. Specifications, size, weight, and surface area of standard units are listed. Varied applications are pictured and discussed.
Tranter Manufacturing Co., Inc.

193—Suction Type Oil Heaters

Sims catalog ST describes and includes engineering data, prices, and weights for its standard line of suction type oil heaters. These heat exchanger units apply heat at the storage tank outlet to assure free flow of bunker "C", No. 6 fuel oil, or similar liquids. Various types of Sims equipment are illustrated.
The Sims Company, Inc.

194—Heat Exchanger Manual

This catalog contains an engineering section that provides the engineer with the means to make size estimates of heat transfer equipment. It helps the engineer to select a heat exchanger that will provide economy of service, precise operation, and long life. Contains thermal standards and reference data.
Condenser Service & Engrg. Co., Inc.

HIGHWAYS, BRIDGES, AND STREETS

195—Bridge Flooring

This booklet contains complete descriptions, specifications, drawings, and design data covering all types of Am-Bridge I-Beam-Lok. Included are details of flooring applications plus a brief discussion showing how Composite Tee-Beam Action can be used with I-Beam-Lok.
American Bridge Division,
U. S. Steel Corporation.

196—Highway Traffic Signs

New bulletin 58 is a specification book of 16 pages for permanent aluminum increment sheet highway traffic signs. Included are detailed drawings for the installation of various types of signs. Charts maximum sign widths for one, two, three, and four post supports.
Traffic and Street Sign Company,
Division of Pfaff & Kendall

197—Welded Highway Girders

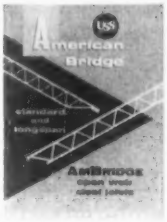
Bulletin discusses design economics and fabrication of welded highway girders as presented in two talks before the 1958 National Engineering Conference of the AISC. Speakers were Omer W. Blodgett, Design Consultant, and R. A. Wilson, Dir. of Application Engineering.
The James F. Lincoln Arc Welding Foundation.

200—Traffic and Safety Equipment

This illustrated brochure describes Planet's new line of highway traffic and safety equipment. Included are overhead sign trusses, roadside directional signs, bridge railings, pedestrian overpasses, and the "Planoflash", a portable night construction warning signal that is more visible than those commonly used.
Planet Corporation.

198—Aluminum Lighted Standards

Twelve-page loose-leaf booklet on aluminum lighting standards. Encased in folder designed for quick reference when filed. Gives specifications on various models of many designs. Pictured are typical installations. Contains drawings of accessories and modifications. Comparison charts of steel and aluminum.
Kerrigan Iron Works, Inc.



201—Steel Joists

This 40-page steel joist catalog contains complete design information for spans up to 120 ft. It covers in detail design calculations, bridging, end details, and accessories. Complete tables of properties and dimensions, standard loading, and design load.
American Bridge Division, U. S. Steel Corporation.

199—Suspension Bridge Data

Catalog D-943 contains technical data making possible preliminary calculations for comparative estimates between the suspension bridge and any other contemplated type. Includes formulas for determining cable and suspender lengths, cable tensions, erection calculations, and catenary formulas.
John A. Roebling's Sons Corporation.

202—Signal and Sign Supports

Catalog TE-1, 20 pages, describes different types of all-aluminum supports for traffic control signals and signs. Shows typical installations, detailed drawings, and complete specifications for vertical signals, horizontal signals, truss type sign spans, pedestals, sign supports, and bases. Also signal arrangements.
Pfaff & Kendall.

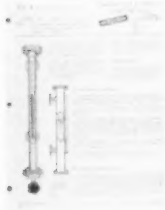
INSTRUMENTS AND CONTROLS

203—Time Recording Systems

"First Quality for Timing Accuracy" contains general description of electronic, synchronous wired, and Autoset impulse time and program systems with illustrations of the master time control, secondary clocks, and signals. Also illustrated and described briefly are attendance time recorders, job cost recorders.
Stromberg Time Corp.

206—Fluid Control Valves

Catalog 70 describes valves for optimum fluid control (gas, steam, or liquid); actuated by pneumatic controllers; spring loaded (direct or reverse) or pressure balanced, diaphragm type actuators. Cast steel or alloy globe and angle bodies, single or double port; screwed and flanged connections.
Black, Sivalls & Bryson, Inc.



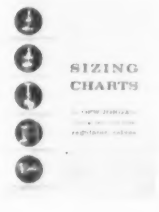
204—Magnetic Gages

Data Unit 306 fully describes and illustrates the new Jerguson magnetic gage which is designed for gaging liquids under conditions where glass, gaskets, and threads cannot be used due to the high potential danger of explosion or fire if the slightest trace of gas escapes. Dimensions and specifications are given.
Jerguson Gage & Valve Company.

207—Specification Guide

Form 632 is a specification guide especially designed in handy folder form to assist consulting engineers to specify their choice of tank contents gaging systems for each project. Contains sample specifications for hydraulic system, and hydrostatic systems (manually operated and continuous reading).
The Liquidometer Corporation.

205—Pneumatic Recorder-Controllers

Bulletin T-1000 gives design and operating data on the Johnson line of pneumatic recorder-controllers and indicating controllers for automatic regulation of temperature, humidity, and pressure. Typical uses in air conditioning, heating, ventilating, and industrial work are explained in this 20-page booklet.
Johnson Service Company.

208—Regulator Valves

Bulletin J-SC shows how to size OPW-Jordan sliding gate regulator valves. Technical data (applying to all makes of valves) tells how to adjust for variations in pressure, temperature, viscosity, and specific gravity. Charts cover steam, liquid, gas services. Four-page J-SC eliminates time consuming computations.
Jordan Corporation.

209—Controls Price Lists

A new complete set of price sheets so designed that engineers, buyers, and purchasing agents will be able to price 90% of the complete line of liquid level and flow controls manufactured by Magnetrol, Inc. Includes specifications about specific gravity, pressure, and temperature ratings of the controls.
Magnetrol, Inc.

To order personal copies of these bulletins, please fill out the card between pages 2 and 3 or 42 and 43.

210—Float-Operated Controls

Several styles of float-operated devices to set off electric warning signals, bells, sirens, or warning lights, for use with liquid containers, are described in bulletin D1. Certain combinations provide for fuel cut-out service also. Two and three-light signal devices and electric vibratory horns are listed as accessories.
The Reliance Gauge Column Co.

211—Water and Sewage Meters

Bulletin 314-1, 20 pages, describes in detail the design and operation of Sparling's complete line of Main-line propeller meters for water and sewage works. Describes the principle and advantages of propeller metering. Various types shown, sizes 2 to 72 in., with graphs showing high accuracy and low head loss curves.
The Sparling Meter Company.

212—Industrial Pressure Gages

Catalog 305 introduces the entirely new USG "A"-Line of general purpose industrial gages, which conform to or exceed ASA Grade A standards. Various designs and sizes, for use in air, oil, steam, refrigerants, hydraulic or ammonia systems, compressors.
U. S. Gauge Div.,
American Machine and Metals, Inc.

213—Magnetic, Mechanical Relays

Catalog 57-S4 describes the ASCO line of magnetically and mechanically held relays. Lists relays rated up to 25 amperes in pole combinations to 24 poles. Information on time relays, reverse current, broke winding, voltage and frequency type close differential, current type welding is included.
Automatic Switch Company.

214—Flow Tubes

The Gentile Flow Tube, now in use for metering water, air, steam, oil, jet fuel, hydrocarbon liquid, clay, slurry, raw sewage, brine, methanol vapors, black liquor, casing head gas, coke oven gas, argon, helium, sludge, white water, and paper stock, is described in six-page bulletin FT. Sizes start at ⅜ in. I.P.S.
Foster Engineering Company.

215—Liquid Depth Gages

Bulletin 6004 describes a new line of remote reading industrial liquid depth gages. It presents comprehensive information on operation and design of the Petrometer series 1400 gages, and on the method of selecting the right gage for remote indication of depth or quantity of liquids in tanks and pressure vessels.
Petrometer Corporation.

216—Closed Circuit Television

Vicon closed circuit television systems are described in new 6-page pamphlet V-1-58. The pamphlet gives complete illustrated data on Vicon cameras, camera control units, monitors, accessories. The Vicon systems provide exceptional picture clarity, continuous duty performance, are adaptable to all operating conditions.
Insul-8-Corporation.

217—Liquid Level Controls

Bulletin F-4A describes Fisher displacement type pneumatic proportional and two-position liquid level controllers in iron, steel, or alloy constructions for pressures up to 2500 psi. Models also available for specific gravity and interface level control applications and as indicators and transmitters.
Fisher Governor Company.

218—Temperature Control Valves

This 6-page bulletin J-180 completely describes OPW-Jordan sliding gate self-operating temperature control valves, features, and method of operation. Contains sizing charts, dimensional drawings, control ranges, material specifications, and accessory item list. Write for more information.
Jordan Corporation.

219—Clocks and Signals

New engineers' and architects' catalog contains general descriptions, illustrations, specifications, and complete details on time and program systems (electronic, synchronous wired, Autoset impulse); clocks (secondary, synchronous, wall, double-faced, tower, special designs); signal equipment.
Stromberg Time Corp.

220—Safety Heads

Catalog 77 describes the positive protection against sudden buildups of overpressure provided by BS&B Safety Heads, a code-accepted pressure relief device. The unit consists of a prebulged metal rupture disc, firmly gripped between two flanges, that ruptures at a predetermined pressure.
Black, Sivalls & Bryson, Inc.

221—Automatic Control Systems

New 8-page planning guide for engineers and architects, covers the 3 important phases of designing a building's automatic control system. Describes the various types of control systems, basic components for each, selection factors to consider in design, and data on centralized remote control applications.
Barber-Colman Company.

222—Automatic Controls

Sixty-page catalog 858 illustrates a full line of mercury switch equipped controls for applications involving pressure, temperature, liquid level, mechanical movement; also hermetically sealed mercury switches and transformer relays. Available in various case styles for indoor, outdoor, or hazardous locations.
The Mercoid Corporation.

223—"Electric Ear"

New brochure AH-480 describes the "Electric Ear," an electronic device for regulating the feed rate to grinding mills, based upon the grinding sound from the mill. The "Electric Ear" has been modified to include a sound-level recorder, which keeps a 24-hour record of operations, indicates variations that occur.
Hardinge Company, Inc.

224—Automatic Regulators

Four-page condenser catalog outlines the range of Foster automatic regulators for the control of pressure, temperature, liquid level, and flow; also flow tubes, an impact-type head meter designed for accurate measurement and regulation of fluid flow. Catalog contains 9 complete tables of specifications.
Foster Engineering Company.

225—Electric Controls

Engineering reference catalog 18A contains a complete line of standard Zenith electric controls and timing devices. Photos, diagrams, engineering data, and prices on automatic transfer switches, magnetic contactors, remote control switches, program clocks, automatic reset timers, cycle timers, and special controls.
Zenith Electric Company.

226—Tank Contents Gaging Systems

Suggested specifications for tank contents gaging systems – hydraulic, hydrostatic, and direct reading – are given in bulletin 463A. Model selection guides and pictorial diagrams are included, along with a list of liquids successfully gaged by Liquidometer systems, and principles of operation of each gage.
The Liquidometer Corporation.

227—Valve Controls

"Limitorque Control," 30-page catalog L-550, gives background information on this automatic, power activated device for controlling all types of valves and sluice gates. It describes the available types and lists specific applications. Installations are shown in power plants, refineries, and in various industries.
Limitorque Corporation.

228—Remote Liquid Level Controls

Bulletin WG-1824, Supplement A, describes function and operation of new Yarway differential-pressure transmitter for controlling a distant liquid level indicator, controller, or other electrically operated receiver. Explains how it is used, how it operates, lists numerous advantages, gives operating specifications.
Yarnall-Waring Company.

229—Closed Circuit Television

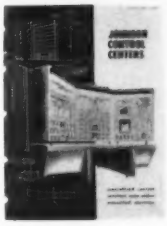
Bulletin 2140 describes Model 500 closed circuit television camera system . . . compact and complete for industrial use. Camera is self adjusting to compensate for wide variations in scene brightness. Weatherproof housings available for outdoor use. Picture viewed on UtiliVue monitor or TV receiver.
Diamond Power Specialty Corp.

230—Diaphragm Control Valves

Bulletin E-657A describes Fisher diaphragm control valves with iron, steel, or alloy bodies for all temperature, pressure, and corrosive conditions. Direct and reverse acting spring and pressure balanced top-works are listed and a section providing tabular material to aid in valve selection is included.
Fisher Governor Company.

231—Liquid Level Gages

New 8-page, 3-color bulletin 338 covers in detail the complete line of Truscale remote reading liquid level gages. Three styles–Standard, Red Flasher, and Inclined–are available in 4 models to provide for every requirement. Information includes features, operation, and applications.
Jerguson Gage & Valve Company.

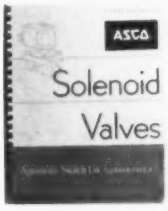


232—Centralized Pneumatic Controls

Bulletin S-103 describes the functions, applications, and operation of centralized pneumatic controls for air conditioning, heating, and ventilating systems. The advantages of using pneumatic transmission are explained and the latest developments in control center instrumentation are shown in this 12-page booklet.
Johnson Service Company.

233—Magnetic Crane Controls

Unit 84 provides important information on Whiting's magnetic controls for crane operation. Four-page booklet points out the many advantages of these controls and shows why they mean improved operator efficiency. Contains illustrations of control panel and chart of hoisting and lowering speed curves.
Whiting Corporation.



234—Solenoid Valves

This solenoid valve catalog provides complete information on the comprehensive line of ASCO solenoid valves. Listed are 2-, 3-, and 4-way valves for standard duty or for special applications (corrosion resistant, sanitary, bulk loading, and steam). An illustrated engineering section includes flow diagrams.
Automatic Switch Company.

235—Dial Thermometers

Catalog 205, 12 pp., describes line of completely new dial direct- and remote-mounted thermometers, with mercury, gas, vapor, or organic liquid actuation, with aluminum or phenolic cases in various designs including variable-angle. Ranges, bulb sizes, connections.
U. S. Gauge Div.,
American Machine and Metals, Inc.

236—Irrigation Meters

Sparling irrigation meters and other irrigation equipment is covered in bulletin 500, a 36-page, profusely illustrated 4-color book. Principles of propeller metering are discussed. Typical types of installations are also shown with cutaway views. Accuracy and head loss curves are provided. For every irrigation application.
The Sparling Meter Company.

237—Liquid Level Gages

How the Eye-Hye gage helps protect the power plant from liquid level accidents is explained in four-page catalog 500, Sec. CO. A diagram shows the flexibility of placement possible: near boiler, tank, or other vessel, or on instrument panelboard, nearby or considerably removed from the boiler.
The Reliance Gauge Column Co.

INSULATION

238—"Ultralite" Duct Insulation

Catalog ULD describes the use of Ultralite, the long textile type insulation for duct wrap and duct liner. Characteristics of Ultralite duct liner, together with application methods, are illustrated. Facings available, shipping information, and location of local stocks are given. This 8-page catalog includes specifications.
Gustin-Bacon Manufacturing Co.

243—Fused Silica Insulation

Bulletin FS-1 describes Foamsil, a new insulating and refractory material. Contains background information on this new material, which is 99% pure fused silica and has a practical operating range of -450 F to 2200 F. Material is unaffected by practically all commonly used acids. Physical characteristics outlined.
Pittsburgh Corning Corporation.

239—Plastic Pipe Insulation

Bulletin IN-213A describes Johns-Manville's Aerotube foamed plastic pipe insulation. This insulation stops sweating, is clean, sanitary, and extremely flexible. It comes in six-foot lengths and can be installed at substantial labor savings. Photographs show installation procedures on new jobs, and existing piping.
Johns-Manville Corporation.

244—Underground Pipe Insulation

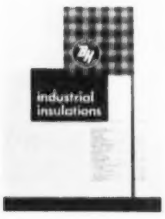
Four-page illustrated brochure discusses the problems of underground pipe insulation and explains how Gilsulate's special properties overcome them. On-the-job photographs illustrate ease and speed of application. Thermal coefficients of transmission and other technical data and specifications are given.
American Gilsonite Company.

240—Underground Pipe Insulation

News magazine, published by the manufacturer of Gilsulate insulation for underground hot pipes, carries stories and articles on actual installations. This issue describes use of Gilsulate in installations at Esso Research Center and Tennessee Eastman, announces booklet available, "Gilsulate At Your Service."
American Gilsonite Company.

245—Pipe Insulation

Brochure J-531 describes new B-H 101 pipe insulation. Designed for lower cost installation of steam-traced lines and pipes up to 30 in. Felted mineral wool pipe insulation faced with 2 x 2⅝ in. 16 ga. galvanized welded wire fabric. Fast fastening – thread lead wires under stay wires, then bend. Data and specifications.
Baldwin-Hill Company.



241—Industrial Insulations Catalog

Just published, this fully illustrated 20-page catalog contains a temperature guide for insulation selection and data on Baldwin-Hill's complete line of industrial insulations and accessories. Thermal conductivities, graphs, recommended thicknesses, product sizes, and uses are given for each of 17 types of insulation.
Baldwin-Hill Company.

To order personal copies of these bulletins, please fill out the card between pages 2 and 3 or 42 and 43.

242—Sprayed Asbestos Insulation

Bulletin SL-8 describes fire-protection, acoustical control, anti-sweat, and heat-saving properties of sprayed "Limpet" asbestos, a simple sprayed-on blanket of 100% asbestos which adheres to all interior surfaces without hiding decorative details. Up to four hours' fire-protection provided to beams and floors.
Keasbey & Mattison Company.

246—"Snap-On" Pipe Insulation

"Snap-On Pipe Insulation," eight-page booklet, describes characteristics and application data for one piece, fine-glass pipe insulation. Application specifications cover: plumbing, heating, insulation of valves and fittings, cold piping, and dual temperature outdoor piping. Thickness charts are also included.
Gustin-Bacon Manufacturing Co.

247—Duct Insulation

Bulletin IN-177A describes Johns-Manville "Spintex" duct insulation. This 6-page bulletin contains photographs showing ease of cutting, nonburning qualities, and method of installation. Diagrams show installation of flexible and semi-rigid Spintex. Specifications include weight, width, length, and thickness.
Johns-Manville Corporation.

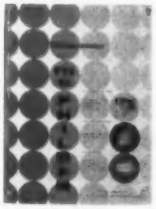
248—"Foamglas" Insulation

Booklet FL-104 describes the use of Foamglas insulation in low temperature spaces. This product is vapor-proof, vermin-proof, dimensionally stable, incombustible, and waterproof. Booklet contains photographs and brief descriptions of unusual types of cold storage enclosures made possible by this new product.
Pittsburgh Corning Corporation.

LIGHTING

249—Industrial Lighting

Industrial Lighting Newsletter – the first issue of the second volume of the continuing RLM service to specifiers of industrial lighting equipment – includes items on ballasts for high-output 800-ma. lamps, code numbers for mercury lamps, vaportight fixtures, porcelain enamel. Subscriptions are free to consultants.
RLM Standards Institute, Inc.



254—Aluminum Lighting Units

Folio 59-1, a 12-page booklet, describes the McPhilben line of cast aluminum lighting units for special purpose applications. Divided into 3 sections: vaportight, weathertight lighting; exit and directionals; and general lighting. Revised specifications, dimensional drawings, applications, and optional features.
McPhilben Lighting Inc.

250—Fluorescent Lamp Ballasts

"How Fluorescent Lamp Ballasts that Bear the CBM Emblem Insure Your Lighting Investment" is a 16-page illustrated booklet. The booklet explains how the Certified Ballast Manufacturers Association's ballast specifications covering lighting performance benefit all persons concerned with fluorescent lighting.
Certified Ballast Manufacturers Ass'n.

255—Louvered Ceiling

Bulletin N-58 describes the SC-Min-Cell louvered ceiling. Available in two sizes, 2 x 4 and 3 x 3 ft. modules. Louvers are fabricated of aluminum, finished in baked white enamel or new Ripple-Tex aluminized finish. Included are suggested layouts, construction details, and illustrations of typical installations.
Neo-Ray Products, Inc.

251—Recessed Lighting Elements

Folder OD-1005 describes Uni-Frame new recessed incandescent lighting elements. One box size for up to 300 watts. Largest lens area available for 12-inch square opening. Single frame available in white enamel, satin aluminum (anodized), satin brass finish (anodized). Can be installed in poured concrete.
Day-Brite Lighting, Inc.

256—Ballast Reference Guide

Bulletin 1206 is an up-to-date cross reference guide of current and obsolete fluorescent lamp ballasts. You can specify "for wall mounting" and receive your copy on extra heavy stock. Ballasts are listed numerically and by lamps. Included is a code-date chart and list of Advance replacements for other brands.
Advance Transformer Co.

252—Recessed Lighting

A comprehensive 20-page catalog details the latest in recessed modular fluorescent lighting. It shows how 2x2 ft and 2x4 ft units of Optiplex, Domex, and Strialux are precision engineered to fit the new ceiling constructions, describes all design features. Catalog includes installation drawings, complete lighting data.
Lightolier, Inc.

257—Lighting Fixtures

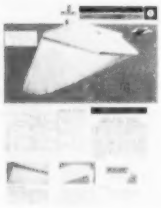
Catalog Section DF, Part A, describes new P-V (perfect vision) luminaires. These beautiful, modern fixtures are designed for easy installation to stay clean longer and service quickly. They deliver unusually even light distribution and can be hung close to the ceiling without causing hot spots. Available west of Rockies.
Smoot-Holman Company.

253—Industrial Lighting Fixtures

The new, 12-page Guth condensed catalog provides a compact presentation of the complete line of Guth fluorescent and Brascolite incandescent luminaires for commercial, industrial, and institutional lighting applications. Data on surface and pendant mounted units, recessed luminaires, and Gratelite electric ceilings.
Edwin F. Guth Company.

258—Emergency Lighting Systems

Standard's new 20-page catalog 243A describes their emergency lighting systems. Besides fully describing these Underwriters' Laboratories approved systems featuring 100% electrical supervision, the new catalog contains information and specifications on all components, fixtures, and exit signs.
The Standard Electric Time Company.



259—Lighting Fixtures

Catalog page on Miller Sabre fixture for lighting stores, offices, schools, corridors, and public buildings. Fixture comes in 2 lamp, 4 foot size, one-piece wrap around refractor, shallow depth, sweeping lines. Catalog contains information on calculating illumination, application data, and specifications.
The Miller Company.

260—Lighting Bulletin

Neo-Ray's lighting bulletin describes many different types of surface/recessed lighting fixtures, fluorescent and incandescent, in all modular sizes. Shielding mediums range from small cell louvers to Holophane Controlens, glass or acrylic. Recessed units furnished with jack-clamps for mounting in ceiling systems.
Neo-Ray Products, Inc.

261—Fluorescent Ballasts

This 6-page folder is entitled "Why High Power Factor Ballasts Cut Your Lighting Costs." It is worded in simple, nontechnical terms explaining the advantages of ballasts for fluorescent lighting. Outlined are other benefits from the use of certified ballasts, as specified by Certified Ballast Manufacturers Ass'n.
Certified Ballast Manufacturers Ass'n.

To order personal copies of these bulletins, please fill out the card between pages 2 and 3 or 42 and 43.

262—Vapor-Proof Lighting Fixtures

Bulletin 5-A, 20 pages, completely describes and lists Appleton's V-51 convertible vapor-proof lighting fixtures with exclusive unit assembly. The V-51 is designed for use with heavy wall rigid conduit in areas where vapors and heavy air create a lighting problem. Reflectors of steel construction are available.
Appleton Electric Co.

263—Aluminum Lighting Fixtures

Folio 58-7, 4 pages, describes McPhilben's new anodized cast aluminum lighting line for industrial and institutional applications. Ceiling units and wall brackets in both 100 and 200 watt sizes including accessories are illustrated with photographs and dimensional drawings. Specifications, applications, engineering.
McPhilben Lighting Inc.

264—Recessed Lighting

An important new 16-page catalog of the latest precision-engineered fluorescent lighting for stores, offices, public areas. Fully details a new controlled brightness lens (Acrylens), a new extruded aluminum flange for arrow-straight continuous runs, and a wide range of Optiplex and Sightron diffusers.
Lightolier, Inc.

265—Industrial Lighting Fixtures

New 8-page, 4-color brochure describing Guth Kolorkoded industrial lighting fixtures opens a new field in industrial lighting. Folder includes photographs, lighting data, engineering information, and complete descriptive data on Kolorkoded luminaires and standard RLM reflector units.
The Edwin F. Guth Company.

266—Specifications Book

New specifications are included in the 1958 RLM Standard Specification Book, a reference guide for those concerned with industrial lighting units, covering: 2-lamp and 3-lamp special service fluorescent units; 3 types of units using 800 ma. fluorescent lamps; new incandescent reflector sizes; new specifications.
RLM Standards Institute, Inc.

267—Industrial Lighting Fixtures

Folder OD1010 describes comfort-for-industry fixtures from Day-Brite Lighting. Illustrates power groove, slimline, rapid-start. CF1 20 with Cleartex plastic enclosure brings new levels of comfort to industrial lighting. Pictured are various types of fixtures and hangers. Louvered fixtures also available.
Day-Brite Lighting, Inc.

MATERIALS HANDLING AND STORAGE

268—Conveyor Systems

Bulletin G-3B describes Fuller rotary compressors and vacuum pumps; horizontal-grate material coolers; Fuller preheater, Humboldt suspension type; Fuller-Kinyon Airveyor, and F-H Airslide conveying systems for handling dry, pulverized, granular, and crushed materials. Fully illustrated.
Fuller Company.

269—Car Thawing Equipment

Bulletin 168 explains the principles of infra-red heat rays and how they can be harnessed to melt frozen bulk material, thereby speeding up the unloading of railroad cars in wintery weather. Various applications are pictured and several case histories given. Features and specifications and different models included.
Hewitt-Robins Incorporated.

270—Tanks: Case Histories

The Echo, employee magazine of Graver Tank & Mfg. Co., Inc. offers in its current fall issue various case histories of Graver-built tanks and process vessels for different industries. Refinery tanks and spheres, caustic tanks, penstocks for drainage projects, and fuel oil tanks for office building heating are covered.
Graver Tank & Mfg. Co., Inc.

271—Materials Handling Equipment

Bulletin 5000A covers Conco custom-engineered overhead electric traveling cranes, of double girder construction. Can be furnished in a wide range of capacities and spans. Also included are hand-powered overhead traveling cranes, hand-powered and electric hoists.
Conco Engineering Works,
Div. of H. D. Conkey & Company.

272—Linings and Tile Tanks

Scope of complete service – design, installation, and maintenance – of corrosion-resistant linings and tile tanks described in 4-page bulletin which also describes the types of membrane linings and tile types and shapes used in lining and erecting silos, slurry tanks, chests. Bulletin A-158.
Stebbins Engineering and Mfg. Co.

273—Concrete Storage Bins

Construction of Super-Concrete stave storage bins for industry is explained in the folder, "Bins with the Strength of Pillars." Contains tables of capacities and photographs of typical installations. Lists of prominent users, varieties of materials stored, and other uses for the bins are given in this valuable bulletin.
The Neff & Fry Company.

274—Concrete Storage Silos

A 12-page brochure dealing with engineering and service facilities of Marietta Concrete Corporation. Modern storage silo applications for industry and agriculture are presented. Advantages of using curtain wall precast wall panels in speeding up construction are given with names of companies using panels.
The Marietta Concrete Corporation.

275—Feeders and Conveyors

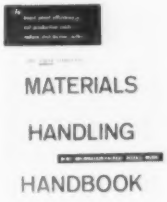
Catalog 930 completely covers the Jeffrey line of electric vibrating feeders and includes related equipment such as bin level indicators, conveyors, coolers, dryers, and barrel packers. Feeder and conveyor capacities and principals of operation are detailed. Drawings and specifications are included.
The Jeffrey Manufacturing Co.

276—Pneumatic Conveyors

Spencer bulletin 143-B describes pneumatic conveying with stationary and portable systems. A typical diagram of each type is given; also a chart of approximate capacities and photographs showing various system components. Examples with illustrations of applications of pneumatic conveyors are shown.
The Spencer Turbine Company.

277—Automated Handling Systems

Catalog 67-A describes, illustrates (photographs and diagrams) engineered and automated handling systems. The 16-page "Plan with Planet" brochure also illustrates equipment for bulk and unit materials, automated and special handling machinery, and foundry equipment, and describes Planet's creative service.
Planet Corporation.

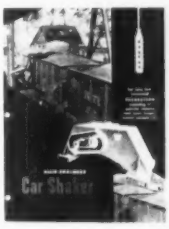


278—Materials Handling Handbook

The first complete, integrated guide to efficient handling of materials – whether in raw, in-process, or finished form. Covers principles, procedures, and systems. Editor: Harold A. Bolz; Associate Editor: George E. Hagemann; with board of 84 contributing, consulting editors. 961 ills., tables; 1750 pp. 6x9. $20.
The Ronald Press.

279—"Volumetric" Feeder

Bulletin TP-11-M is a 6-page publication which describes the equipment, operation, and major features of the Wallace & Tierman Volumetric feeder. This feeder is specifically designed to allow custom installations from standard components. Included is a chart showing typical types of installations.
Wallace & Tierman Incorporated.



280—Car Shaker

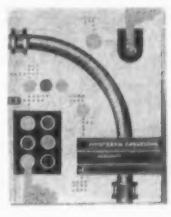
Bulletin 07B7221B describes the many operating advantages and lists specifications of car shaker for unloading granular materials from open, hopper-bottom gondola cars. Push-button operated, the car shaker can unload cars in less than two minutes, even if material is damp, compacted, or partially frozen.
Allis-Chalmers Manufacturing Co.

281—Materials Handling, Processing

Fully illustrated brochure 182, 36 pages, presents a report of R&S diversified services for coal and iron ore mining, steel mills, and railroads. It features materials handling and processing facilities; also ore beneficiation plants aside from specialized coal preparation plants and fabrication in well equipped shops.
Roberts & Schaefer Company.

282—Car Pullers

Ten-page bulletin L-6 shows capstan type car puller for moving cars a short distance using manila rope. Three styles of drum car pullers for heavy duty car moving, shuttle work, or for servicing very large areas are also listed, as well as barge movers for shifting barges back and forth during unloading.
Clyde Iron Works, Inc.



283—Pneumatic Conveying

Information on how pneumatic conveying has solved bulk-handling problems is presented in bulletin 530. System diagrams point out applications and flexibility of equipment. Photos illustrate typical installations. Bulletin lists materials which can be handled and illustrates available conveyor accessories.
Dracco Division of Fuller Company.

284—Industrial Storage Systems

"Modern Industrial Storage Systems," 12-page brochure 4393, discusses the subject of storage for raw ingredients, semi-processed, or finished materials. The flexibility and adaptability of concrete silos is discussed. Descriptions of component parts and construction are supplemented with line drawings.
The Marietta Concrete Corp.

To order personal copies of these bulletins, please fill out the card between pages 2 and 3 or 42 and 43.

285—Concrete Storage Bins

Bulletin describes Super-Concrete storage bins for industry. Explains how bins are engineered specifically to purchaser's requirements. Describes the installation of concrete roofs and elevated floors, when desired. Lists materials stored and gives prominent users. Contains tables of capacities and photographs.
The Neff & Fry Company.

286—Conveyor and Elevator Belts

Bulletin 170 describes C/R (cotton/rayon) conveyor and elevator belting. This belting is available in light, medium, and heavy duty, as well as chemical and fire resistant service. Comparison tests cotton/rayon versus cotton/nylon are given. Case history of C/R belt application. Specifics and advantages of C/R belting.
Hewitt-Robins Incorporated.

287—Tank Design Reference Book

This handy reference booklet contains tables of circles and spheres, area and volume formulas, decimals of an inch and foot, tile shapes, standard reinforcing bars, wood pulp fiber in solution, capacities of tanks, conversion factors, and other information for use in designing tanks. Bulletin TC-155.
Stebbins Engineering and Mfg. Co.

288—Reprints for Framing

Four-color reprints of Graver's current ad on elevated water tanks are available upon request. Suitable for framing and office decoration, this newest ad is a striking close-up of the 600,000-gal. tank built for the Capehart project at Fort Meade, Maryland. Other types shown on the back of the reprint.
Graver Tank & Mfg. Co., Inc.

MECHANICAL POWER TRANSMISSION

289—Reducing Gears

Bulletin J-14 gives complete engineering data on nine standard sizes of worm-helical units with ratios from 25.63 to 1 up to 357.5 to 1 and horsepower ratings from .85 to 175. Typical cross sections are diagramed. Included are application data, load characteristics, service factors, selection procedure, and specifications.
Jones Machinery Div., Hewitt-Robins Inc.

290—Flexible Gear Couplings

Advantages and typical applications of flexible gear couplings are pictured and described in 16-page catalog C-5, "The Revolutionary New Sier-Bath Flexible Gear Couplings." Couplings are available in standard, vertical, millmotor, floating shaft, and spacer type, and in many special purpose types.
Sier-Bath Gear & Pump Co., Inc.

291—Worm Gear Reducing Units

Complete technical data on entire line of Holroyd reducers (catalog 5016) includes hp and torque tables, efficiencies, dimensions, weights, and oil capacities for eight types of single and double reduction units. Single reduction ranges from 5:1 to 70:1; double, 25 to 4900, horizontal and vertical.
De Laval Steam Turbine Company.

292—Right-Angle Gear Drives

Right-angle solid shaft gear drives, for centrifugal pumps and industrial use—cooling tower installations, barge service, sewage disposal, fire and flood control—manufactured in a wide range of models to meet specific requirements, are described and illustrated with engineering details in eight-page catalog 29.
Johnson Gear & Manufacturing Co., Ltd.

293—Variable-Pitch Sheaves

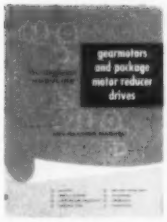
Integral-shaft variable-pitch sheaves for stepless speed control of large machine drives are discussed in bulletin 20B7897B. Advantages listed for this type of drive include wide speed range, accurate speed control within 0.1%, while drive is in motion, and the inherent low-cost of a V-belt drive.
Allis-Chalmers Manufacturing Co.

294—High-Speed Gears

Eight-page bulletin S130 describes Terry high-speed gearing for speed-increasing or speed-reducing service. Designs for gears, gear cases, bearings, and the lubrication system are fully illustrated and explained in the text. Approximate over-all dimensions are given for the smaller units.
The Terry Steam Turbine Company.

295—Reducing Gears

New 36-page catalog H-55 gives pertinent information on design and uses for a complete line of parallel shaft speed reducers. Specifications, information required, procedure for selecting unit, table of load characteristics, dimensions, horsepower ratings, overhung load capacity charts, and parts list.
Philadelphia Gear Corporation.



297—Package Motor Reducer Drive

Fully illustrated booklet 7223, 33 pages, includes recommendations, ratings, dimensions, and other application data, to assist the consulting engineer in selecting the proper gearmotor or package motor reducer drive for his particular application. This manual describes Moduline gear units for maximum adaptability.
Westinghouse Electric Corporation.

296—Turbine Pump Drives

Right angle turbine pump drives, in standard and combination drive installations and available in a wide range of models to meet specific requirements of high or slow speed prime movers and pumps, are described and illustrated in nine-page catalog 30. Tables show power ratings and average efficiencies.
Johnson Gear & Manufacturing Co., Ltd.

298—Worm Reduction Gears

Bulletin J-13 gives detailed description of six types of worm gear reducers. General specifications, styles available, application data, and service factors. Step-by-step selection procedure with various examples. Included are ratings for types and standard dimensions. This 40-page booklet is well illustrated.
Jones Machinery Div., Hewitt-Robins Inc.

PIPING, VALVES, AND PLUMBING

299—Standpipe Fire Protection Units

First major improvement in 30 years in standpipe fire protection units is completely illustrated and described in this 8-page catalog. Features hose storage rack on door for increased fire fighting efficiency. Unit saves wall space. Lower installation cost, lower price, Underwriters' approved.
W. D. Allen Manufacturing Co.

303—Water Coolers

This new 20-page, two color booklet 892 describes the complete Ebco line of water coolers. Emphasis is placed on this company's new cooler which furnishes both hot and cold water permitting the making of beverages. Features of the cooler are described in words and pictures. Booklet also describes accessories.
Ebco Manufacturing Company.

300—Electric Water Coolers

New bulletin illustrates complete line of self-contained electric water coolers—pressure bubblers, bottle coolers, hot and cold in pressure and bottle types, models with freezer compartments, dual bubbler unit, and water cooler accessories. Identifying model selection and capacity chart for specification.
Haws Drinking Faucet Co.

304—Cast Iron Pipe

Booklet I.-126 describes American "Fastite" joint cast iron pipe. Pipe is useful for water, sewage, and other liquid service. It is easier to assemble and faster laying for lower installation cost. Complete specifications in chart form are given for all diameters. Fittings are illustrated as well as typical installations.
American Cast Iron Pipe Company.

301—Process Piping Valves

New bulletin 115 covers some basic points to consider when selecting valves for process piping systems and emphasizes the many advantages and savings that can be made by the proper selection of valves to meet piping characteristics. Some typical process applications are also covered. Cut-away drawing shows valve operation.
Hills-McCanna Company.

305—Gate Valves

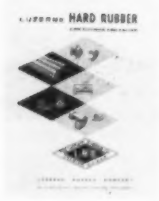
Ludlow & Rensselaer bulletin A describes in detail double disc gate valves. Cut-away photographs show various parts and construction. Line drawings show the different types of valves with dimensions charted for each valve. Directions for ordering new valves and repair parts are given. Valves A.W.W.A. approved.
Ludlow Valve Manufacturing Co., Inc.

302—Cast Steel Valves

New 8-page brochure lists information on OIC's complete line of cast steel gate, globe, angle, and check valves. It also completely identifies all the various designs available in the long line of OIC forged steel gates in union and bolted bonnets, inside screw and OS&Y. Globes and angles are also listed.
The Ohio Injector Co.

306—Bronze Valves

Four-page circular 602-2 describes the two pressure classes of LQ600 bronze globe valves with patented Brinalloy seats and discs. It details features and sizes of Fig. LQ600-150 valve, rated at 150 lb. SP, 30 lb. WOG; and Fig. LQ600-200 valve, rated at 200 lb. SP, 550 F, 400 lb. WOG.
The Lunkenheimer Co.



307—Hard Rubber Pipe, Fittings

New, complete, twelve-page, two-color bulletin PF-1300 describes hard rubber pipe, fittings, and valves; dimensions, chemical, and physical properties of heat-resistant Buna-N compound and natural rubber as well as general information. Cross-section dimensional drawings of all types of valves are shown.
The Luzerne Rubber Company.

308—Fabricated Pipe Fittings

Bulletin 525 illustrates standard and special fabricated fittings which help in planning piping and equipment layouts. Data includes specifications and prints on standard fittings for lightweight pipe. The bulletin also illustrates special fabrications designed to save time and labor.
Naylor Pipe Company.

309—Wafer Butterfly Valves

Bulletin 580 describes Rockwell's heavy-duty type butterfly valve for manual or automatic flow control of air, gases, steam, water, process liquids, and semi-solids. Sizes to 36 inches and special larger sizes. Standard valves are made of high-strength cast iron with carbon steel shafts. Pressure drop chart included.
W. S. Rockwell Company.

310—Steam Pipe Fittings

New condensed 4-page catalog SS-140-B gives descriptions, specifications, and prices on Strong "Hydro-Flex" steam traps, strainers, reducing valves, and float and thermostatic traps. Included are the new ductile (nodular) iron traps and strainers for 600 psi that will bend or twist without breaking.
Strong, Carlisle & Hammond.

311—Pipe Protection Tape

Tapecoat X is a coal-tar protective coating in tape form for pipe, pipe fittings and joints, conduit, cable, insulated pipe, tie rods. Material is heated lightly with a torch, then wrapped onto pipe surface with one-half inch overlap. Provides protection on underground pipe equivalent to hot-applied coal tar.
The Tapecoat Company.

To order personal copies of these bulletins, please fill out the card between pages 2 and 3 or 42 and 43.

312—Liquid Coolers

Complete selection information and engineering data. Cools multiple liquids, carbonated or noncarbonated beverages, water, liquid food products, brines, alcohol, wine, many acids, and oils. Wide range of capacities. Close temperature control. Bulletin T-366 is illustrated and contains tabled specifications.
Temprite Products Corporation.

313—Magnetic and Motorized Valves

Within its 24 pages, catalog V-58 illustrates and lists specifications of magnetic and motorized valves for use with air, water, gas, steam, oil, and refrigerants. Also included are solenoid coil rating tables—one for liquids, the other for compressible fluids. Dimensional drawings are included.
The Mercoid Corporation.

314—Blow-Off Valves

Bulletin B-435 (59), Supplement A, describes new Yarway hard seat-seatless unit tandem blow-off valve for medium boiler blow-off pressures of 665 psi (basic pressure rating 400 psi) or 515 psi (basic pressure rating up to 300 psi). Four-page bulletin gives all data on blowing and sealing valves and how to specify.
Yarnall-Waring Company.

315—Steam Traps

Bulletin 808 describes the new 500-C series steam traps, combination open float and thermostatic type. Cutaway drawings show both thermostat and bucket operation. Photographs show accessibility of parts for service. Gives specifications needed for ordering. Included are capacity data and specifications.
Wright-Austin Company.

316—Stainless Steel Pipe Fittings

This 22-page catalog explains how Speedline stainless steel fittings reduce piping costs by allowing the designer to take advantage of the new and more economical schedules 5 and 10 stainless steel pipe. A schematic drawing illustrates industrial applications.
Speedline Stainless Steel Fittings Div., Horace T. Potts Company.

317—Flange Matching Tables

Handy tables help select correct forged steel flange to mate with plug valves. Where applicable, bulletin TT880 also gives ring number, bolt diameter, stud-bolt length, and number of bolts. Covers carbon steel, stainless steels, and other alloys. File folder size for convenient reference.
Tube Turns div. of Chemetron Corp.

318—Vitrified Clay Pipe

Jointed vitrified clay pipe known as Amvit, with a built-in mechanical joint made from polyvinyl chloride, is described in four-page folder. Advantages such as infiltration prevention, quick installation, immediate backfilling, better flow, shock absorption, and quick testing in the field are pointed out.
American Vitrified Products Company.

319—Steel Valves

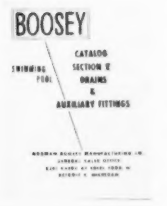
Catalog 14 describes the complete Edward line of cast and forged steel valves for power, petroleum, chemical, marine, and industrial applications. Data includes ASA dimensions, ASA pressure-temperature ratings, and ASTM basic materials specifications.
Edward Valves, Inc., Subsidiary of Rockwell Manufacturing Company.

320—Wrought Iron Pipe

Comprehensive 64-page booklet discusses 4-D wrought iron pipe for downspouts, soil, waste, and vent lines. Includes sections on corrosive conditions, comparative service, Durham systems, cost considerations, and specifying data. Photographs of vent corrosion accompany two building piping surveys.
A. M. Byers Company.

321—Bronze and Iron Valves

Fairbanks 1958 valve comparison chart permits user to determine the figure numbers of Fairbanks bronze and iron body valves that, by similarities of design, construction, and pressure rating, may be used in same application as valves of other manufacturers. Comparison tables are arranged alphabetically.
The Fairbanks Company.



322—Swimming Pool Drains, Fittings

A new Section No., B-49-C-V, is announced by Norman Boosey Mfg. Co. This catalog section gives the consulting engineer everything at finger tip for any problem encountered in fittings for drainage and control of circulation in swimming pools. This new catalog makes it easy to specify the right drain.
Norman Boosey Manufacturing Company.

323—Fire Hydrants

Bulletin 56H describes different types of fire hydrants, all complying with American Water Works Association's latest specifications. Engineering features, material specifications, construction details, various assemblies in exploded view, and installation dimensions are shown. Also included are directions for ordering.
Ludlow Valve Manufacturing Co., Inc.

324—Flexible Ball Joints

Bulletin 31 contains layout diagrams, photographs, and data on how to solve problems of thermal expansion and contraction in piping economically with flexible ball joints. Applicable to piping runs of any length and of any diameter from ¼ inch to 12 inches, including high temperature steel piping.
Barco Manufacturing Company.

325—Prefabricated Piping Systems

The new edition of the Ric-wiL product catalog covers construction features for prefabricated, insulated piping systems for steam, hot water, oil, or refrigeration distribution lines. Types of systems covered include Hel-cor, Uniline, type J, and cast iron. Prefabricated accessories are also included.
Ric-wiL, Incorporated.

326—Standpipe Fire Equipment

A new reference book for engineers deals with standpipe fire protection equipment. Called "Checkbook," it is a digest of essentials for any installation except sprinklers. Facilitates selection of equipment from a wide range. Illustrations, diagrams, and model specifications in coupon form elaborate the text.
W. D. Allen Manufacturing Co.

327—Drinking Fountains

A 28-page catalog of drinking fountains, electric water coolers, emergency eye-wash fountains, and drench showers, faucets, bubblers, and flush valves as appearing in 1960 Sweet's Catalog. Specifications and rough-in details of models. Featuring metal forms for installation in poured concrete walls.
Haws Drinking Faucet Co.

328—Solder End Valves

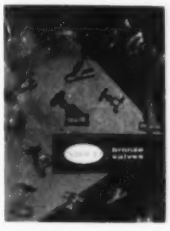
Two-page circular 603 details sizes, dimensions, types, and features of solder end globe, gate, and check valves, particularly suited for steam, hot, and cold water lines; heating and air conditioning systems; oil, natural, and manufactured gas lines; underground water lines; and industrial uses.
The Lunkenheimer Co.

329—Snow Melting Systems

"Steel Pipe Snow Melting and Ice Removal Systems," 32 pages, presents the case for snow melting systems and shows typical installations in commercial and industrial locations. Design data is complete with information on anti-freeze mixtures, sizes, and spacing.
Committee on Steel Pipe Research, American Iron and Steel Institute.

330—"Thermo-Panel" Coil Data

Prices and data on Dean Thermo-Panel Coils which "Take The Place Of Pipe Coils" for industrial heating and cooling processes. Bulletin 258 shows how to do your own estimating. Zinc metallizing; edge sealing; double and single embossed; heat transfer.
Dean Products, Inc., Dean Thermo-Panel Coil Division.



331—Bronze Valves

Catalog VC-3 describes and illustrates the complete line of NIBCO bronze valves. Illustrations show valve interiors with all parts numbered to facilitate ordering. The new Y-Pattern globe valve is featured with flow charts giving advantages. Includes special section on how to choose proper valves and discs.
NIBCO, Inc.

332—Butterfly Valves

Bulletin 650-R2 describes design advantages, types of valve operators available, dimensional data, and includes handy sizing nomograph for selecting butterfly valves. Bulletin is well illustrated with application and product photos, cutaway drawings, and tabular data. Capacities to 125 psi.
B-I-F Industries, Inc.

333—Anchor Fittings

Bulletin TT858 describes and provides dimensional data for Tube-Turn welding neck anchor forgings which hold high pressure lines immobile at valve settings, meter stations, and other installations where uncontrolled thrusts could damage equipment. Designed for 1200 psi and 900 F change in temperature.
Tube Turns div. of Chemetron Corp.

334—Forged Steel Valves and Fittings

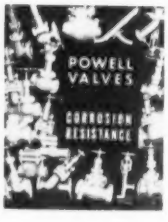
Henry Vogt Machine Company has just released its new catalog of forged steel valves, fittings, flanges, and unions. Its 432 thumb indexed pages feature new types and trims to meet severe fluid and gas handling duties at all temperatures and pressures. A permanent book containing complete information.
Henry Vogt Machine Company.

335—Safety Cleanout Valves

Bulletin 4004 describes the Petrometer safety cleanout valve for safe removal of water and sludge from storage tanks containing volatile liquids, eliminating danger of fire or explosion. Construction features and operation are discussed. Valve can be connected to the tank through liquid level indicator lines.
Petrometer Corporation.

336—Centrifugal Separators

Bulletin 810 contains information on low cost centrifugal "T" type entrainment separators. Explains the advantages of the new type separator. Included are selection and capacity charts for both air and steam, complete specifications for three types of separators, and charts of separator and trap recommendations.
Wright-Austin Company.



337—Corrosion-Resistant Valves

Eight-page bulletin describes and illustrates a number of valves: gate, globe, angle, check, "Y", and flush bottom tank, and liquid level gages – for use in corrosive services. Also lists the wide variety of metals and alloys in which valves can be furnished and available sizes. Bulletin is illustrated.
The Wm. Powell Company.

338—Gate Valves

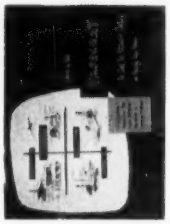
Gate valves are described in this brochure which features views of the disassembled valves, pinpointing the various integral parts. Various types of gate valves are illustrated. Bulletin contains trim and pressure rating chart, chart of general dimensions, and chart of material specifications.
The Ohio Injector Co.

339—Stainless Steel Pipe Fittings

New 86-page master reference volume on stainless steel pipe fittings gives detailed information on broad line of IPS and tube O.D. fittings, ASA, MSS, and corrosion weight. Technical section includes manufacturing standards, specifications, corrosion-resistance tables, and data on welding of stainless steel.
Ladish Company.

340—Glass-Lined Sewer Pipe

Folder deals with the glass-lined sewer pipe with a mechanical joint. Amvit Glas-Glaz pipe is available in 4-ft lengths. It is root and infiltration proof and is glass lined inside and out. The pipe has been designed for an under-the-house drain and also as a house-to-street sewer.
American Vitrified Products Company.



341—Pipe Protection

Hot coal-tar protection in easy-to-apply tape form for pipe, pipe fittings and joints, conduit, cable, insulated pipe, tie rods. Material is heated lightly to soften the pitch, then spirally wrapped onto pipe surface. Tapecoat provides long-life protection that is equivalent to a hot applied coal-tar pipeline coating.
The Tapecoat Company.

342—Refinery Fittings

Bulletin KR-1257, specifically prepared for engineers, gives general descriptions with illustrations of 48 proven types of refinery fittings and alloy steel welding fittings. Also included is a section with information designed to aid in simplifying inquiries and in specifying fittings. Bulletin is illustrated.
W-K-M, Division of ACF Industries, Inc.

343—"Hot'n Cold" Water Coolers

Booklet entitled "How to cut coffee-break time in half" is offered by Ebco. This booklet describes the new Hot'n Cold water cooler with a beverage locker. Complete line of Hot'n Cold coolers are illustrated. Also shown in pictures are the various applications. Shown in chart form are possible yearly savings.
Ebco Manufacturing Company.

344—Butterfly Valves

Bulletin 579 describes "Stress-Sealed" butterfly valves for shutoff of fluid flow under wide variations in ambient temperature of fluid from minus 200 F to plus 1300 F, even in handling corrosive or dirty gases or liquids. This valve is designed and built to shut off within very narrow leakage tolerance.
W. S. Rockwell Company.

345—PVC Pipe Fittings

Bulletin PF 1200, eight pages, presents a list of applications for PVC pipe and fittings where corrosion resistance, nontoxicity, and noncontamination are required. Mechanical, electrical, thermal, and miscellaneous properties of both normal impact and high impact PVC products are in table form.
The Luzerne Rubber Company.

346—Cast Steel Globe Valves

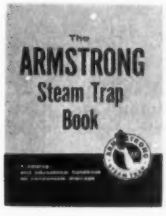
Catalog 14-B describes the new Edward line of "Flite-Flow" low-pressure-drop cast steel globe valves available in 1500 psi and 2500 psi pressure classes in sizes 10 in. through 18 in. ASA dimensions, ASA pressure-temperature rating, and ASTM basic materials specifications.
Edward Valves, Inc., Subsidiary of Rockwell Manufacturing Company.

347—"Polyfusion" Technique

Folder describes the advanced "Polyfusion" technique for joining "Vulcathene." Conventional flame or electricity and a "Polyfusion" tool are used to make joints between "Vulcathene" fittings and tubes. It takes less than a minute, and no special skill, to make a permanent joint.
American Vulcathene Div., The Nalge Co., Inc.

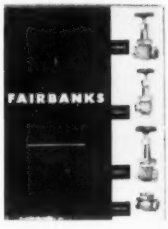
348—PVC Pipe

Corrosion ratings in 400 chemicals are listed in types I and II PVC, and for eight ferrous alloys and nonferrous metals. Characteristics, applications, properties, and installation practices are described in 30 pages. Engineering data includes working pressures at elevated temperatures, head loss, friction factors.
A. M. Byers Company.



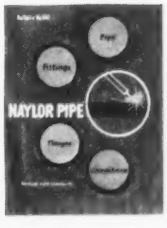
349—Steam Traps

Catalog K, the Armstrong steam trap book, has been revised and expanded to 48 pages. New material includes complete data on Armstrong open float and thermostatic steam traps; and strainers in ½ to 6-inch sizes in semi-steel; new pipe size tables; and additional data on trap selection.
Armstrong Machine Works.



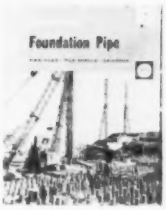
350—Bronze Valves

Fairbanks Underwriters' Approved bronze globe, gate, and check vaives for all types of piping systems for storing, transporting, and utilizing liquefied petroleum (butane-propane) gases, liquid or gaseous, are described in circular V-110. Construction features, pressure ratings, and dimensions given.
The Fairbanks Company.



351—Lightweight Pipe Fittings

New 8-page condensed catalog summarizes complete line of Naylor lightweight pipe, fittings, flanges, and connections. Lists typical applications. Includes standard specifications on pipe from 4 to 30 inches diameter, together with details on standard fittings and flanges. Covers couplings for pipelines.
Naylor Pipe Company.



352—Foundation Pipe

Catalog FP 10758 describes a spirally, butt-welded pipe and its advantages; also pile shells – continuous lock seam corrugated pipe. Typical installations are illustrated. Included is list of data needed when specifying foundation pipe. Also table of dimensions, specifications, and other data.
Armco Drainage & Metal Products, Inc.

353—Ball Joint Pipe

Booklet L-115 describes American "Molox" ball joint pipe for river crossings and other difficult installations. Map shows various locations of installations. Gives description, suggestions for use, method of assembling. Many pictures are used showing actual installing of pipe. Complete specifications on all diameters.
American Cast Iron Pipe Company.

354—Strainers

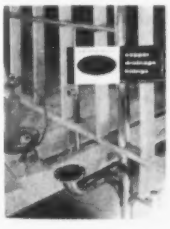
Bulletin SS-21B gives data on complete line of strainers for steam, air, gas, oil, and water lines. Available in semi-steel, cast steel, bronze, block steel, and new ductile (nodular) iron. For collection of dirt, scale, and other foreign matter in the line, preventing clogging and damage to systems and equipment.
Strong, Carlisle & Hammond.

355—General Service Valves

Dimensions and detail drawings plus a parts list are included in 20-page bulletin E-165. Bulletin discusses class 125 single and double disc, class 250, cylinder-operated valves, lubricated valves, valves for emergency protection, steam-jacketed valves, and valves for boiler blow-off. Fully illustrated.
Everlasting Valve Company.

356—Building Drainage Products

A new presentation of Section No. B-49-C-VI catalog, giving the consulting engineer everything at finger tip for any problem encountered in miscellaneous drainage of surfaces and equipment for his building, is announced by Norman Boosey Mfg. Co. This catalog replaces former bound No. 34 1949 edition.
Norman Boosey Manufacturing Company.



357—Copper Drainage Fittings

Catalog DWV-2 describes the NIBCO line of copper drainage fittings. The proper design of a drainage system is discussed, and the step-by-step installation procedure is shown. Each fitting is illustrated and the various available sizes are listed. Included in back of catalog is a glossary of terms.
NIBCO, Inc.

358—Bronze, Iron, Steel, Alloy Valves

Composite catalog, 24 pages, on bronze, iron, steel, and alloy valves for controlling the flow of water, oil, gas, air, steam, and corrosive fluids. Lists pressure and temperature ratings and available sizes. Also shows flush bottom tank valves, lubricated plug valves, liquid level gauges, and other specialties.
The Wm. Powell Co.

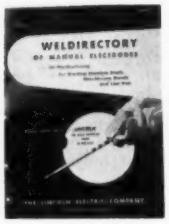
359—Ball Valves

Catalog 1000 covers full-bore and reduced port ball valves in steel and semi-steel. Complete specifications cover semi-steel ball valves, from ½ through 6 in., 200 to 400 lbs wog; ASA steel ball valves sizes ½ through 6 in.; ASA series 150; and ½ through 3 in. x 2 in. ASA 300.
W-K-M, Division of ACF Industries, Inc.

PLANT SITE AND EQUIPMENT DATA

360—Scaled Models

"Designing in 3-D" brochure describes new ideas in do-it-yourself 3-dimensional drafting. It is a concept of using scale models for original design engineering. The applications are almost unlimited; product design, process plant design, industrial plant layout, architecture, mining, construction projects all can be designed.
Scott Industries, Inc.



363—"Weldirectory"

This Weldirectory describes Lincoln manual arc welding electrodes for hard-surfacing and for welding stainless steels, nonferrous metals, and cast iron. It includes information on the application, properties, and procedures for using each electrode. Guides selection of proper electrode for each application.
The Lincoln Electric Company.

361—Industrial Opportunities

A colorful new presentation of Colorado's industrial opportunities. Included are booklets on manufacturing, power, raw materials and resources, transportation, markets and labor, Colorado living, industrial site locations, state highway map and full color recreation booklet. Up-to-the-minute data in portfolio form.
Colorado Department of Development.

364—Improve Efficiency

Contained in 20-page booklet (25B9084) are descriptions of 59 ways in which your clients can improve operating efficiency, increase production, lower cost of new equipment, reduce maintenance, or improve working and safety conditions. Covers over 35 electrical, mechanical, and materials handling products.
Allis-Chalmers Manufacturing Co.

362—Production Handbook

This famed handbook condenses and integrates everything known about industrial production, organization, systems, principles, today's techniques for achieving maximum productivity at minimum costs. Editor, Gordon B. Carson; with Board of 48 contributing, consulting editors. 725 ills., tables; 1700 pp., 6x9, $16.
The Ronald Press.

365—Scaled Models

"Designing in 3-D" catalog describes model making techniques, and new uses for models in plant layout, product design, process plant layout topography. Architectural and structural. Catalog lists thousands of parts available for model making – pipe, fittings, ladders, vessels, valves, motors, with sizes and prices.
Scott Industries, Inc.

POWER EQUIPMENT AND FUELS

366—Stationary Gas Engines

Bulletin SA-610 gives specifications and performance data on K-67 and K-75 6-cylinder stationary gas engines with maximum horsepower ratings of 265 and 302 respectively. Units are for standby or continuous duty power for municipal and other industrial applications.
Climax Engine Manufacturing Co., Division of Waukesha Motor Co.

368—Package Boilers

A completely new line of low and high pressure forced draft water tube packaged boilers is described in bulletin 1400. Known as the Compak series, these factory-tested units are offered in 22 sizes ranging in capacity from 12 through 750 horsepower. Engineering specifications with catalog literature.
The International Boiler Works Co.

367—Package Steam Generators

New six-page bulletin entitled "More Performance From Less Investment" describes in detail Cyclotherm's line of 18 sizes of package steam generators, 15 hp to 650 hp. Also specifications, on 10 sizes of new package hot water generators, 670 MBH to 6700 MBH.
Cyclotherm Division National-U.S. Radiator Corp.

369—Electric Plants

Catalog KEP56-1, 24 pages, shows the line of Kohler electric plants used as an independent source of electricity for sole supply and for automatic standby when central station power fails. Sizes range from 500 w to 50 kw, gasoline and diesel. Battery charging units in 6, 12, 36, and 140 v capacity are described.
Kohler Company.

370—Emergency Electric Plants

New folder describes entire line of Onan emergency electric plants, controls, and accessories. Typical applications in hospitals, schools, stores, industries shown. Simple description of the function of Onan's automatic line transfer control is presented. Onan installation requirements listed.
D. W. Onan & Sons, Inc.

371—Industrial Oil Burner

Factory engineered and built integral air register for control of combustion air is feature of Petro WR burner. Register controls entire air supply for maximum combustion efficiency. Models available for firing all fuel oils, including number 6, and for dual fuel oil-gas firing. For Scotch or firebox boilers.
Petro.

372—Mobile Generating Plants

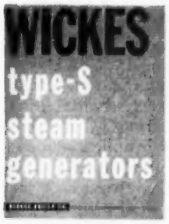
Trailer mounted mobile generating plants, complete rolling power stations, are described in this plastic-bound handbook. For temporary tie-in, or semipermanent installation diesel or dual fuel operation these mobile plants may be practical. In four sizes: 350, 500, 1000, and 1250 kw.
White Diesel Engine Division,
The White Motor Company.

373—Package Boilers

Catalog P391, 16 pages, describes the new Type VP package boiler. Following a section of background information is an outline of principal design features. These boilers are shop assembled and provide steam capacities from 4000 to 42,000 lb per hr. Space requirements and specifications are in table form.
Combustion Engineering.

374—Matched Boiler-Burner

Illustrated, full-color literature covers the 52 to 651 hp series of Kewanee-Iron Fireman forced-draft packages for all types of gas and all grades of oil, or combination firing of both. Advantages of design, construction, and operation are given, plus cutaway model view, ratings, and over-all dimensions.
American-Standard, Industrial Division.



375—Steam Generators

Wickes type-S steam generators, two-drum, water tube boilers built to a design pressure of 725 psi, are described in catalog 55-2. These units combine the water cooled furnace as an integral part of the boiler, adapting the high and low type furnace to the desired type of firing — coal, oil, or gas.
The Wickes Boiler Company.

376—Filter Separators

Single pass of jet fuel, gasoline, diesel, fuel oils, kerosene, and similar petroleum products produces dirt-free, water-free product up to 600 gpm. For jet fuels, meets applicable requirements of MIL-S-254A and MIL-F-8508A. Illustrations of typical installations are shown. Gives specifications and dimensions.
Bowser, Inc.

377—Oil Separator

Eight-page bulletin T-447 describes how Temprite can make oil work for you — not against you — with an oil separator that keeps oil in the refrigeration system compressor where it belongs. Outlines typical high-efficiency installations, and includes complete engineering specifications and dimensions. For F-12 or F-22.
Temprite Products Corporation.

378—Use of Aluminum

Maximum economy in construction of a generating station results from wide use of aluminum. Alcoa reports that optimum use of aluminum is over five pounds per kilowatt of capacity, in over sixty different types of applications, all discussed in this new 36-page booklet. Shows current installations.
Aluminum Company of America.

379—Three-Pass Package Boilers

Webco-Ray automatic 3-pass packaged boilers for heating, power, and process steam are featured in the 1958 Webco catalog. Ratings, data, dimensions, installation details, and other specification data are given in this 8-page booklet. Capacities of these packaged units range from 25 to 600 boiler hp.
Western Boiler Company.

380—Three-Pass Marine Boilers

Bulletin B-3333 describes the Titusville 3-pass Scotch marine boilers. Photographs show boilers equipped with Iron Fireman, Petro burner, Ray burner, or North American burner. Mechanical features of this boiler are explained. Also thermal features are outlined. Certified results of Titusville 3-pass boiler tests.
The Titusville Iron Works Company.

381—Scotch Boilers

Complete descriptive and specification information on rugged Scotch boilers for gas, oil, and coal firing, and automatic underfeed stokers for Scotch type boilers, is given in 28-page bulletin 236. This illustrated brochure includes test results, performance data, and details of design and construction.
The James Leffel & Co.

382—Heat Recovery Silencers

A 12-page bulletin gives full information on Maxim heat recovery silencers, used to produce steam or hot water for heating or processing operations. Engineering data includes descriptions, capacities, installation, blueprints, cutaways, dimensions. Typical installations are described, complete with layouts.
Emhart Mfg. Co., Maxim Division.

383—Spreader Stoker

Bulletin 800 describes and illustrates the Detroit RotoStoker "CC" — a spreader stoker with overthrow rotor feeders. The unique design reciprocating grate continuously discharge ash at the front. Smokeless operation . . . burns a wide variety of coals. For boiler capacities to 75,000 pounds of steam per hour.
Detroit Stoker Company.

384—Forced Draft Burners

Describes and illustrates several typical Iron Fireman industrial forced draft burner applications. Package burners, complete with forced draft fan and control panels, fire gas, all grades of fuel oil, or dual fuel. Applicable to all types of high or low pressure boilers, particularly Scotch Marine.
Iron Fireman Manufacturing Co.

385—Steam Generators

Bulletin GB-1 gives testimonial proof of the value-packed Amesteam generator, packaged firetube boiler. Sizes available: 10 through 600 horsepower; 15 through 250 pounds design pressure. Lists well-known users with photographs of actual installations. Illustrated literature available upon request.
Ames Iron Works.

To order personal copies of these bulletins, please fill out the card between pages 2 and 3 or 42 and 43.

386—Four-Pass Boilers

Bulletin AD162 describes basic design features of Cleaver-Brooks model CB self-contained boilers: four pass, forced draft design with 5-sq ft heating surface per boiler horsepower. Rated 15-200 hp: oil, gas, or combination fired with quick fuel interchange. For heating or processing, steam or hot water.
Cleaver-Brooks Company.

387—Recirculation Generators

Basic advantages of the Type LFW forced recirculation generators for high temperature water are given in ten-page bulletin 700. Chart compares capital investment, operating costs, and maintenance and repairs for high temperature water and high pressure steam for district heating from central plant.
The International Boiler Works Co.

388—Package Boilers

Leading manufacturers of packaged boilers differ in arrangement of heating surfaces. Some of them insist that best design requires 3 or 4 gas passes through the boiler to extract heat from combustion gases. Others say it can be done with 2 passes. Continental boilers are designed for two passes.
Boiler Engineering & Supply Co., Inc.

389—Boiler Service Valves

Bulletin E125, 22 pages, "Everlasting Boiler Service Valves," contains quick and slow opening straightway valves—Model W, angle valves, "Y" valves, duplex blow-off units, water column valves — Model W, and fire protection valves — opening and closing types. Includes a full page of material specifications.
Everlasting Valve Company.

390—Manufacturers' Directory

Indexed, current directory of equipment manufacturers for coal-fired plants. Components include: boilers (all types), stokers and burners, dust collectors, instruments and controls, conveyors, elevators, silos for coal and ash handling. A nationwide aid for consultants specifying such equipment.
Bituminous Coal Institute.

391—Underfeed Stokers

Bulletin 203 contains specifications for using Vulcan stokers where capacities up to 3500 lbs of coal per hour for loads up to 800 hp are required. "Synchro" combustion controls automatically adjust fuel-feed, air supply, boiler draft, and combustion rates. "Turbo-Aire" system complies with smoke regulations.
Canton Stoker Corporation.

392—Package Boilers

"Package Boiler Economy for Modern Hot Water Systems," describes Cyclotherm's Cyclonic Combustion, a patented principle, now incorporated in a design to efficiently produce hot water. No other type boiler can match the package unit for economy of space and fuel.
Cyclotherm Division
National-U.S. Radiator Corp.

393—Diesel Engines

Complete 80-page catalog includes power curves, sectional drawings, and subassembly photographs of six basic engines in 19 models, a power range of 100 to 2150 bhp. Diesel, gas, and dual fuel engines and generator sets are available as a custom installation.
White Diesel Engine Division,
The White Motor Company.

394—Spreader Stokers

New bulletin 860 illustrates and describes the Detroit RotoStoker, a spreader stoker with overthrow rotor feeders. For use with medium size boilers up to about 60,000 pounds of steam per hour capacity. Power dumping, hand dumping, or stationary grates. May be installed in almost any type boiler.
Detroit Stoker Company.

395—Mechanical Draft Fans

New bulletin FD 905 covers the complete line of mechanical draft and other heavy duty fans. Information covers shafts, housings, inlet boxes, variable inlet vanes, dampers, bearings, shaft seals, blade and scroll liners. Applications discussed include forced and induced draft, primary air, cyclone compressors.
Buffalo Forge Company.

396—Integral-Furnace Boiler

Bulletin G-94 describes B&W's newest integral-furnace boiler, Type PFI. This new pressurized-furnace, oil and gas fired steam generator is designed for power, process, or heating loads requiring steam capacities up to 400,000 pounds per hour at pressures to 1150 psi and steam temperatures to 900 F.
The Babcock & Wilcox Company.

397—Steam Turbines

A collection of twenty bulletins, illustrating and describing Terry solid-wheel, helical-flow turbines; single-stage and multistage axial-flow turbines; and a number of different types of governors for various applications. Approximate dimensions are included for many of the types and sizes of turbines described.
The Terry Steam Turbine Company.

398—Hydraulic Turbines

Details on the Leffel turbines that drive both power generation and pumping units at the United States Bureau of Reclamation Chandler Power and Pumping Plant in the state of Washington are given in 12-page bulletin 1098-E. Literature on other Leffel turbine installations will be enclosed.
The James Leffel & Co.

399—Retracting Soot Blowers

"You Clean Boilers Better and at Lower Cost with Diamond Blowers," 14-page bulletin 2111, details construction features of the Series 300 IK long retracting blowers. It describes the stationary gear motor drive, motor and control terminal facilities, valves, nozzles, carriage drive accessories.
Diamond Power Specialty Corp.

400—Cast Iron Boilers

Twelve-page catalog of commercial and industrial cast iron gas, oil, and stoker boilers. Net gas ratings to 3105 MBH (119.5 hp), net oil ratings to 2942 MBH (113.2 hp); ratings approved by Institute of Boiler & Radiator Manufacturers. Catalog contains description, ratings, dimensions, and drawings.
Weil-McLain Company.

401—Steam Generators

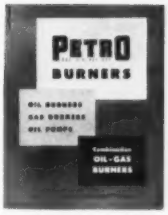
Wickes type-A steam generators, compact, efficient, shop assembled water tube boilers, are illustrated and described in catalog 56-1. It gives typical superheater arrangements for the boilers with section, plan, and side views of drainable "S", pendant, and drainable superheaters. Specifications are given.
The Wickes Boiler Company.

402—Complete Package Boiler

Bulletin MR-1A announces the new compact Model "R" Amesteam Generator, a complete package boiler available in sizes ranging from 10 hp through 600 hp. Oil or gas fired. Each unit is completely equipped with all necessary boiler fittings, is guaranteed to operate at 80 percent thermal efficiency.
Ames Iron Works.

403—Pneumatic Spreader Stokers

Detailed information on P.S. series 401 stokers, which automatically meter, dry, preheat, convey, and efficiently fire all sizes and grades of coal, from lignite to the best bituminous. System continually adjusts firing rate to steam demand. Booklet liberally illustrated with cutaway views, photographs, and diagrams.
Iron Fireman Manufacturing Co.



404—Commercial-Industrial Burners

Twenty-page catalog describes Petro commerical-industrial oil, gas, and dual fuel burners used for heating, power, and process steam requirements. Includes section on "How to Select a Burner." Illustrates several typical installations and various burners, from 8 through 200 gph oil capacity.
Petro.

405—Steam Generators

Bulletin B-3255 describes the Titusville type WTP steam generators. Can be fired with heavy oil, heavy oil and gas, light oil, light oil and gas, and any type of gas. Steam capacities are from 10,000 to 60,000 lb per hour. Generators meet ASME code requirements. Included are photographs showing inner construction.
The Titusville Iron Works Company.

406—Burner Equipment

This new 16-page booklet illustrates and describes Ray Burner equipment for firing oil, gas, or combination oil or gas: manual, semiautomatic, and fully automatic models; rotary, pressure atomizing, inshot gas, packaged forced draft boiler-burner units. A burner for every domestic, commercial, or industrial need.
Ray Burner Company.

407—Automatic Package Boiler

Specifications for application of IBW-BCR Coal-Pak automatic package boiler to low-pressure steam heating, hot water heating, and high-pressure process steam. For plant designs using one 71.6-hp unit to a multiple of 300-hp units. Sample specifications include coal and ash handling, wiring, and boiler room layouts.
Bituminous Coal Institute.

408—Engine Fuel Comparison

Educational pamphlet M-102 deals with comparison of 3 basic fuels used by Onan air-cooled engines. Gasoline, gas, and diesel oil are reviewed as fuels, with descriptions of both piped (natural) and bottled (LPG) gas. The subject of Btu content of each fuel is discussed. The bulletin is illustrated.
D. W. Onan & Sons, Inc.

409—Package Boiler and Burner

Design, construction, operation, and advantages of Kewanee-Petro forced-draft packages are covered in a full-color, illustrated literature piece. Units in the 52 to 651 hp series are covered, both low pressure and high pressure, firing all types of gas and all grades of oil, or both in combination.
American-Standard, Industrial Division.

410—Induced Draft Fans

Bulletin L-3 covers the complete line of centrifugal induced draft fans. Included are rating tables shown at 600 F, dimension data, construction material specifications, recommended sizes of fans for oil, gas, or coal fired boilers. Typical installations are also shown.
Lehigh Fan & Blower Division, Fuller Company.

PROCESS EQUIPMENT

411—Liquid Strainers

Bulletin 6 deals with liquid strainers, single and duplex, for pressures from gravity to 900 psi. Capacities from 6 to 7500 gpm of water or 50 viscosity oil at 6 psi pressure drop. Mesh size 8 to 200, depending on liquid and contaminant. Strainer basket catches all contaminant; none is left in shell or piping.
William W. Nugent and Company, Inc.

412—Materials Handling, Processing

Fully illustrated brochure 182, 36 pages, presents a report of R&S diversified services for coal and iron ore mining, steel mills, and railroads. It features materials handling and processing facilities; also ore beneficiation plants aside from specialized coal preparation plants and fabrication in well equipped shops.
Roberts & Schaefer Company.

413—Process Machinery

Hardinge Company's bulletin 100-B is an eight-page brochure giving a brief description of each of the major items of Hardinge process machinery for the mining, chemical, stone, and ceramics industries, as well as water, sewage, industrial waste-treating, and many other related applications.
Hardinge Company, Inc.

414—Aftercoolers and Separators

Bulletin 712 is a 10-page technical book on aftercoolers particularly for the consultant. Cutaway drawings in three colors help explain the operation. Benefits to be obtained from dry compressed air are given along with chart showing moisture left in given volume of air at pressure. Selection charts and installations.
R. P. Adams Company, Inc.

415—Products and Production

Catalog "This is RECO" describes RECO products, production, and design service in detail. Photographs, listing of practical dimensions, materials, special linings, specifications are shown for pressure vessels, storage tanks, process heat exchangers, pipe, duct, towers, columns, and autoclaves.
Richmond Engineering Company, Inc.

416—Oil Conditioners

Catalog 859 describes new oil conditioners that dehydrate, filter, and de-aerate mineral, animal, vegetable, fish, or synthetic oils. Used to recondition lube, hydraulic, and insulating oils; and for processing oil end-products. Available in three sizes. For continuous or batch operation. Fully automatic.
Bowser, Inc.

417—Packaged Grinding Plant

Design features and operating advantages of a new packaged grinding plant are described in bulletin 07B7138. This new unit can be used for a wide variety of fine grinding applications. Heart of the process is a new vibrating mill capable of producing 15 to 30 times more than conventional mills.
Allis-Chalmers Manufacturing Co.

418—Liquid Filters

Bulletin 7C, 16 pages, illustrates and describes the full line of crenulated laminated disc liquid filters for removing small micron-size foreign solids from most liquids one pass through at a rate of 1 gpm at 1 psi pressure drop to 1260 gpm at 3 psi pressure drop, of 35 ssu viscosity fluid.
William W. Nugent and Company, Inc.

PUMPS AND COMPRESSORS

419—Gas and Vacuum Pumps

California series rotary positive blowers, gas pumps, and vacuum pumps are described in bulletin S-59G with dimension drawings and capacity tables. For volumes up to 2480 cfm single stage with pressures to 10 psi or vacuums to 20 in. Hg. Features anti-friction bearings, wide-face timing gears, oil-free operation.
Sutorbilt Corporation.

420—Pump Catalog

Offer repeated for those who have not ordered. Contains liquid pump performance and specifications and dimension drawings. Types include: centrifugal—single and multistage; turbine; nonclog sewage and sump; steam piston, wet vacuum, condensation, hydraulic plunger, and other types.
American-Marsh Pumps, Inc.

421—Air Compressors

Bulletin CAS-18 describes the complete line of air-cooled Curtis air compressors in sizes ranging from ¼ thru 50 hp. These compressors are available horizontal, vertical, base mounted, and as simple machines—either gasoline engine or electric motor driven. Specifications and data included on all models.
Curtis Manufacturing Co.

422—Centrifugal Pumps

New 8-page bulletin, form 1440, describes the centrifugal pumps, type A5, which are of the volute type for both vertical and horizontal installation. Included are dimensions, weights, engineering information, capacities, and fitting data. Also diagrams of pumps available in thirteen sizes, 1/3 to 2 hp.
Dunham-Bush, Inc.

423—Petroleum Pumps

Catalog 4-PP-11 Rev. describes the features of Gorman-Rupp petroleum pumps. Straight-in-suction, no check valve, and an enclosed impeller feature the "O" Series design. Temperature, altitude, viscosity, performance, and specification tables are available with the complete engineering data in bulletin.
The Gorman-Rupp Company.

424—Centrifugal Pumps

Bulletin B-2100 illustrates and describes the Peerless AquaLine horizontal centrifugal pump line. Immediately available, these compact, easily installed pumps are applicable to many jobs calling for hot and cold water handling circulation and boosting.
Peerless Pump Div.,
Food Machinery & Chemical Corp.

425—Air Compressors

Listing 17 sizes of axial flow type air compressors for discharge pressures up to 15 psig, new bulletin LAH-158 covers requirements from 1000 to more than 12,000 cfm. Ratings are obtained at direct connected motor speeds, and the Spiraxial design requires neither internal lubrication nor cooling water jacket.
Roots-Connersville Blower Division.

426—Boiler Feed Pumps

New heavy duty turbine type boiler feed pumps (to 150 gpm), longer life with least maintenance, are described in bulletin 65, 8 pages. Pumps have specially hardened impellers; oversize, heavy duty bearings, shafting; and leak-proof, wet-or-dry shaft seals. Specifications and details are given in handy bulletin.
Fred H. Schaub Engineering Company.

427—Rotary Pumps

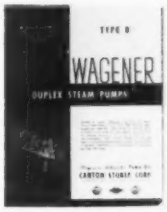
Catalog Section D describes the complete line of Viking positive displacement rotary pumps for handling all types of hazardous liquids requiring Underwriter's approval for this type of service. Pumps range in size from 5 to 300 gallons per minute and are suitable for pressures up to 50 psi. Specifications and dimensions.
Viking Pump Company.

428—"Unipumps"

Bulletin 300, six pages, describes general service Unipumps. Versatility in mounting is pictured and discussed. Folder includes giant pump selection table from 10 to 1700 gpm, heads from 15 to 260 feet for fast reference. Cutaway illustrations show construction. Pump and motor dimensions given.
The Weinman Pump Manufacturing Co.

429—Centrifugal Compressors

New 20-page well illustrated bulletin 909 completely describes the expanded line of American Blower centrifugal compressors. Included are outstanding construction and operating features and typical applications. Ratings based on ASME Test Code Standards.
American-Standard,
American Blower Division.



430—Duplex Steam Pumps

The Type B Wagener duplex pump, suitable for asphalt, molasses, syrup, lard, mash, sewage, heavy oil, and other liquids over 1000 SSU, is described in four-page bulletin WS-46. Specifications, dimensions, and table of standard sizes are provided.
Wagener Pump Division,
Canton Stoker Corp.

431—Industrial Pumps

Catalog describes uses and construction of new FloWay line of industrial pumps manufactured by Fiese & Firstenberger. Capacity range is from 15 to 4000 gpm. FloWay vertical turbine pumps are designed for every industrial and municipal pumping need and for every pumping condition.
Fiese & Firstenberger Mfg., Inc.

432—Screw Pumps

Bulletin SI-6 contains complete data on internal gear and bearing screw pumps. Includes standard horizontal, vertical submerged sump type, vertical dry type hopper, and steam jacketed types. Capacities 1 to 2000 gpm, pressures to 1000 psi, viscosities from 32 to 5,000,000 SSU.
Sier-Bath Gear & Pump Co., Inc.

433—Stationary Compressors

Bulletin A-95 describes and illustrates 3 basic models of single-stage, double-acting, water-cooled, heavy-duty water-cooled stationary compressors of V-vertical or semi-radial design. Eight-page bulletin includes detailed section drawing and fully identified illustrations of vital compressor parts and features.
Joy Manufacturing Company.

434—Proportioning Pumps

Bulletin 302 features the new integral McCannameter and describes design details. This proportioning pump affords space savings of up to 2/3 over previous designs. Available with either diaphragm or bellows construction, with maximum capacities from 6 cc per minute to 6 gph.
Hills-McCanna Company.

435—Trash-Sewage Pumps

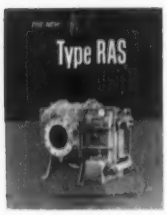
Bulletin on nonclogging, high and dry, open impeller, trash-sewage pumps. These self-priming centrifugals are available in 3, 4, and 6 in. sizes. Feature the ability to handle solids up to 1½, 2, and 2½ inches in diameter. These pumps are useful in dewatering, sewage, and industrial sump applications.
The Gorman-Rupp Company.

436—Rotary Pumps

Bulletin 409 is an 8-page folder illustrating the applications of Viking rotary pumps for handling petroleum products in the producing, refining, and marketing fields. It covers also LP-gas applications, pumping of chemicals, diesel fueling, handling liquid and semi-solid foods, and road-building applications.
Viking Pump Company.

437—Centrifugal Pumps

Bulletin 1000 describes SB multi-purpose split-case double-suction centrifugal pumps. Sectional view illustrates mechanical construction features. Performance curves at 1150, 1750, and 3450 rpm are given. Complete selection table to 180 gpm and heads to 220 feet, plus accurate dimensions for all sizes.
The Weinman Pump Manufacturing Co.



438—Blowers

New bulletin RAS-158 describes positive displacement blowers of completely new design, in 36 sizes from 10- to 20-inch gear diameter. With capacities from 1900 to 14,500 cfm at pressures to 10 psig, these units feature direct-connected speeds, compactness, and a new impeller for safe handling of liquids.
Roots-Connersville Blower Division.

439—Rotary Screw Pumps

New stacked construction of IMO pumps (bulletin 3001) simplifies servicing, converts basic low pressure unit from 400 to 800, 1200, or 1600 psi pressure ranges. Capacities range from 2 to 1000 gpm. Cutaway views of quiet, pulsation-free mechanism, performance curves, dimension and specification sheets.
De Laval Steam Turbine Company.

440—Blowers, Gas and Vacuum Pumps

Series 400 and 600 rotary positive blowers, gas pumps, and vacuum pumps are described in bulletin S65C, including dimension drawings and cutaways. Volumes up to 20,000 cfm single stage with pressures to 10 psi or vacuums to 20 in. Hg. Features anti-friction bearings and wide-face herringbone timing gears.
Sutorbilt Corporation.

441—Boiler Feed Systems

Catalog 55-C contains new specification and application data on standard and special design boiler feed systems from Schaub Engineering Company. Pumps furnished with Dura-Hard Electrolized impellers for "double" service life. High pressure boiler feed systems include rugged power plant pump line.
Fred H. Schaub Engineering Company.

442—General Purpose Pumps

Pump problem formulas, pertinent pump data, friction loss tables, and pump characteristic charts are included in Peerless bulletin B-2314 on the Fluidyne line of end-suction facemount pumps. Available in sizes from ¼ to 7½ hp, these efficient pumps are compact, rugged.
Peerless Pump Div.,
Food Machinery & Chemical Corp.

SOUND AND SIGNAL SYSTEMS

443—School Sound Systems

Four-page brochure 7316-E-58 illustrates and describes a new and complete line of school sound distribution systems. It covers equipment suitable for the smallest to the largest school units. Building block flexibility of console styles, panels, and functions explained. Specification sheets furnished on request.
DuKane Corporation.

444—Economy School System

Eight-page catalog illustrates a flexible, economical school system, combining sound, intercom, and time tone signals. This system can be easily expanded to provide console or rack panel equipment, interior fire, and emergency alarms without sacrificing original wiring, conduit, or classroom stations.
Executone Inc.

445—Clock Catalog

Covers clock and program systems—two types include synchronous motor-powered secondary clocks, the other combining secondary clocks, minute-impulse type. Both have simplified programming, automatic resetting of secondary clocks. Bell control boards, various type signals, and clocks included.
The Standard Electric Time Company.

446—Sound System

Brochure S-130, consisting of eight pages, describes this new concept in loudspeaking intercommunications. It shows series 1200 (transistorized) and series 600 (electronic) models which literally obsolete every similar system made today. Includes features of the two models and is fully illustrated.
Stromberg-Carlson.

447—"Clockmaster" System

Bulletin 76-4584 lists Honeywell's "Clock-Master" systems for master-time and programming. Includes order-information on Honeywell's complete line of minute-impulse and synchronous-wired systems, plus a sample specification and information on the four factors that add up to the unique Honeywell field-service.
Minneapolis-Honeywell Regulator Co.

448—Industrial Sound Systems

Four-page bulletin 12k/Du illustrates and describes sound, alarm, and evacuation systems in use in some of the largest companies in the country. It outlines operation and functions of various types of systems designed to meet specific requirements, and emphasizes use of standard panels for custom systems.
DuKane Corporation.

449—"Dial-X" Telephone System

Folder S-100R-2 shows how to banish seven common telephone annoyances with a Dial-X private telephone communication system. Switchboard equipment and four styles of telephones are illustrated and described for ten to seventy-four line systems. Dial-X system is unmatched for flexibility.
Stromberg-Carlson.

450—Hospital Communication

Twelve-page color booklet illustrates and describes a large variety of individual hospital communication and sound systems, including audio-visual nurse call, doctors' paging, bedside radio-sound, and administrative intercom. Equipment, operating features, local planning, and service facilities available are discussed.
Executone Inc.

STRUCTURAL MATERIALS AND EQUIPMENT

451—Concrete Slab Reinforcement

Catalog BC-592, January 1959, furnishes complete information on Cofar, a combined form and reinforcement for concrete slabs. Product advantages, illustrations of completed projects using Cofar systems, construction details, fire ratings, data on E/R Cofar (for electrical and communication flexibility in the floor).
Granco Steel Products Company.

452—Steel Roof Deck

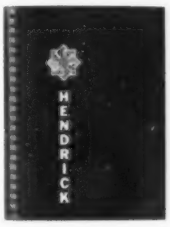
The revision of catalog 240 contains a complete description of Milcor steel roof deck and shows section properties, load tables, accessories, installation information, and suggested engineering specifications. This catalog also gives basic data on Milcor Acoustideck and Milcor Cellu-deck for the consultant.
Inland Steel Products Company.

453—Corrugated Roofing, Siding

New manual 2785 depicts and explains all accepted methods of applying corrugated Asbestone "400." Gives instructions on storage, handling, accessories, sealing compounds, plus detail drawings. Gold Bond corrugated Asbestone "400" resists rot, fire, salt air, corrosion. Also has many interior uses. A.I.A. File No. 12-F.
National Gypsum Company.

454—Cast-in-Place Piling

Newly issued 20-page illustrated special report, No. 102, announces I-P's expanded range of Cast-in-Place piling service. Also featured is I-P's newest development, the post-tensioned Locked-in-Place pile. Technical section explores new theories on methods of determining bearing capacities.
Intrusion-Prepakt, Incorporated.

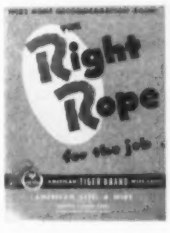


455—Perforated Metals, Screens

This 136-page general catalog describes the complete line of Hendrick perforated metals, screens, and fabricated metals in full detail. Includes complete specifications for round, diamond, square, and slot perforated metals together with full size illustrations of each. Contains ordering information and computation tables.
Hendrick Manufacturing Company.

456—Concrete Tensioning Materials

Catalog PC-936 shows sizes, weights, strengths, and typical load-elongation curve of uncoated stress-relieved strand for pretensioned bonded prestressed concrete. Properties of galvanized strand and uncoated stress-relieved wire for post-tensioned design are listed. End fittings, bearing plates are illustrated.
John A. Roebling's Sons Corporation.



457—Wire Rope

Book of 44 pages, "The Right Rope for the Job," gives recommendations for specific constructions of Tiger Brand wire rope most commonly used on individual types of equipment. Different types of wire ropes are illustrated with cutaway photos. Specifications given.
American Steel & Wire Division,
U. S. Steel Corporation.

458—Hardware, Metal Door Frames

Descriptions and illustrations in bulletin HD-656 explain hardware applications of hinges, locks, and closers on PyroDor solid mineral core fireproof doors. Construction features and specifications are explained. Inside chart, which diagrams PyroDor hardware applications, can be hung for ready reference.
Dusing & Hunt, Inc.

459—Prefabricated Lumber

A 12-page booklet on heavy timber construction. Shows, pictorially, company's facilities with inspection and grading methods. Pictured are various roof construction and drawings using this prefabricated lumber. Heavy timber construction is used economically and efficiently for public buildings.
Rosboro Lumber Company.

To order personal copies of these bulletins, please fill out the card between pages 2 and 3 or 42 and 43.

460—Masonry Reinforcement

All new 1959 Sweet's brochure now available. AA Wire Products Company, manufacturers of masonry reinforcement and masonry ties, announce that the all new 1959 Sweet's brochure is now available. The new brochure features design drawings, photographs of installations, and suggested guide specifications.
AA Wire Products Company.

461—Grating Catalog

This 16-page catalog shows the three basic types of grating construction; gives more than 30 dimensional drawings of subtypes; eight safe load tables covering steel and aluminum grating, roadway grating, and sidewalk slabs; tables on panel widths, tread widths, and floor armor. Planning layouts are given.
Borden Metal Products Company.

462—All-Steel Buildings

New 'erect-it-yourself' all-steel buildings, called the Stran-Master, are described in illustrated catalog. Ideal for low-cost warehousing, light manufacturing, retail stores, general utility, the Stran-Master can be erected by an unskilled crew in 180-200 man-hours. Adjustable telescoping columns and girts.
Stran-Steel Corporation.

463—Ball Socket Flexible Joints

Bulletin 229 describes methods for using ball-and-socket type flexible joints on guy wires, braces, or struts used to position stacks, vessels, piping, or tall columns subject to wind sway, vibration, or thermal movement. Flexible bracing maintains axial alignment while allowing free lateral movement.
Barco Manufacturing Company.

464—Power Hoists

Bulletin 34A, 20-pages, describes the Clyde line of electric, gasoline, and diesel hoists. Gives construction details of medium capacity hoists of various line pulls. Also includes information as to selecting the hoist, information required for hoist quotation, and table of drum cable capacities. Available accessories are listed.
Clyde Iron Works, Inc.

465—Masonry Elastic Seals

Informative four-page bulletin describes three types of masonry elastic seals: Weathertite compressible seals for control joints in block wall, the Everelastic masonry gasket, and rubber waterstops. Bulletin is illustrated with cross-section line drawings showing application of the three seals.
Williams Equip. and Supply Co., Inc.

466—Scaffold Shoring

Bulletin BP-10 describing Beatty scaffold shoring is composed of 6 pages and printed in 2 colors. Contains diagrams, shoring data tables, and description of frames. Wing-nuts and studs are replaced with labor-saving patented Snaplocks. Various applications are pictured. Also described is Pecco shoring.
Beatty Scaffold, Inc.

467—Metal Buildings

Booklet 1567, in full color, describes and illustrates community buildings of all types – schools, churches, public and private buildings – erected from Butler pre-engineered metal building components; styled for specific individual usage. Butler building system provides beauty, quality, economy.
Butler Manufacturing Company.

468—Masonry Wall Reinforcement

This four-page bulletin is printed in two colors and describes Dur-O-wal masonry wall reinforcement. Included are features, advantages, physical properties, and general specifications. Information on cavity wall construction, rod deformation, bonding, and report of tests are also contained in this bulletin.
Dur-O-wal.

469—Steel Design Manual

First complete published manual containing design instruction for use of high strength steels. Includes fundamental characteristics, design considerations, working unit stresses, tension, compression, shear, deformation and deflection, formed sections, and design against corrosion. Engineering, not sales manual.
U. S. Steel Corporation.

470—Roof Deck

Catalog BT-593, January 1959, describes a new concept in roof construction. Tufcor roof deck with insulating concrete plus built-up roof forms lightweight slab for strong, fire-resistant roof construction. Booklet illustrates completed projects using Tufcor, construction details, and other design data.
Granco Steel Products Company.

471—Steel Stair Treads

Tread-Grip steel stair treads combine strength of construction with safe, nonslip footing, according to four-page bulletin HTP2130. This brochure describes such features as A. W. Algrip nosing, electroforged and welded construction, and twisted cross bars. Included are detail drawings and dimensions.
Horace T. Potts Company.

472—Large Doors

Sixteen-page catalog describes the types of doors manufactured and installed for industrial building and aircraft hangar installations. Included are canopy type, motorized slide, turn-over, and vertical lift doors. Doors such as for crane entrances and the "Byrna-perture" for hangars are also described and illustrated.
Byrne Doors, Inc.

473—Cranes

Bulletin 91 describes in detail Whiting's all-new Thrif-T crane, a rugged unit designed with economy in mind. Crane is available in 20, 25, and 30 ton capacities. Bulletin features line drawing showing important crane features and provides pertinent specifications. Photographs show crane in operation.
Whiting Corporation.

474—Insulated Metal Walls

Insulated metal walls and wall panels of various types, and Underwriters' rated fire walls, with over-all "U" factor superior to that of a conventional masonry wall with furred lath and plaster, are described in 16-page bulletin W-58. Materials, construction, thermal properties are given, with construction details.
The R. C. Mahon Co.

475—Wire Rope Splicing

Wire Rope Splicing is a 32-page handbook describing and illustrating various eye splicing methods, endless splices preformed and Lang Lay wire rope splicing, and the Chicago technique. The subjects of grommet socketing and wire rope efficiencies are also covered. Handbook includes descriptive photographs.
Union Wire Rope Corporation.

476—Concrete-Filled Columns

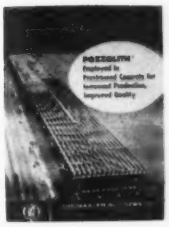
Concrete-Filled Columns: complete illustrated literature on pipe columns, square and rectangular tube columns including safe loads, physical properties, and sample computations. Most fire-resistant, nonfireproof column made, your key to better, safer construction. Types of columns and connections shown.
Tubular Products, Inc.

477—Insulating Concrete

New bulletin C11-1959 describes Permalite insulating concrete for roof decks and floor fills. Specifications for mixing and application are given. General characteristics of Permalite concrete are also discussed. Engineering data, which includes safe uniform loads and physical properties, on roof deck systems.
Great Lakes Carbon Corp.

478—Prestressed Concrete Piles

"Raymond Cylinder Piles of Prestressed Concrete," 20-page catalog, describes and illustrates the manufacture, versatility, and economic applications of prestressed concrete cylinder piles and related prestressed products. Numerous photographs of installations and drawings of suggested designs are shown.
Raymond Concrete Pile Co.



479—"Pozzolith"

Construction stories of 16 outstanding prestressed projects in this country and abroad, featured in a new 20-page book, illustrate the almost unlimited application of prestressed concrete. Photographs and job stories cite role played by Pozzolith in achieving the high quality concrete required for prestressed work.
The Master Builders Company.

480—Flooring, Grating, Treads

General grating catalog F-400 contains illustrations, descriptions, and complete engineering data on grating flooring, treads, and floor armoring (riveted, press-locked, and welded types). Irving grating is safe, durable, fireproof, ventilating, clean, and economical for industrial and power plant flooring and stairways.
Irving Subway Grating Company, Inc.

481—"Rugasol"

This new 4-page bulletin features Rugasol for exposed aggregate concrete. Rugasol is a retardant chemical coating used during construction to obtain either a rough bonding surface for construction joints, cement coats, mortar toppings, or architectural surface texture. Specifications, photographs are included.
Sika Chemical Corp.

482—Rolling Doors

Bulletin 101, 28 pages, is a complete catalog of the many types of doors made by Kinnear. It gives information on the types of operations, both manual and electrical; elevation drawings; mounting methods for various applications and locations; specifications; and explains special construction features of these doors.
The Kinnear Manufacturing Company.

483—Cast-in-Place Piling

Twenty-page "Prepakt Reporter" includes a 16-page report of I-P's expanded range of Cast-in-Place piling service. Article is well illustrated showing actual photographs of operations and usage. Technical section explores new theories on methods of determining bearing capacities.
Intrusion-Prepakt, Incorporated.

484—Curtain Wall Air Conditioning

Bulletin PW-260 describes a new concept of curtain wall function, room-by-room air conditioning, an integral part of the Lupton curtain wall system. This is a true perimeter type system affording individual room control. It is a space saver and is easily installed. Includes capacities, dimensions, and specifications.
Michael Flynn Manufacturing Company.

485—Asbestos-Cement Roofing, Siding

Full-color catalog illustrates K. M. noncorroding, nonrotting asbestos-cement roofing shingles; fluted and ribbed decorative panels; Apac, Linabestos, and Sheetflextos wallboard; corrugated asbestos roofing and siding; building-sewer pipe. Durability, attractive colors, fire-safety of asbestos-cement are stressed.
Keasbey & Mattison Company.

486—Plaster Aggregate

Bulletin P11-1959 contains plastering specifications and fireproofing data for Permalite plaster aggregate. Describes the characteristics of Permalite expanded perlite, its many advantages, and the results of its use as a lightweight fireproofing on ceilings, walls and partitions, and columns and beams.
Great Lakes Carbon Corp.

487—Aluminum Building Products

A 36-page booklet offering complete information on Alcoa aluminum industrial building products. Includes diagrammed details on roofing, siding, sandwich walls, flashing, and fasteners. Advantages of using aluminum are outlined, and specifications on all products are suggested. Various applications are illustrated.
Aluminum Company of America.

488—Electrified Floor Systems

Mahon electrified Cel-Beam floor systems designed to safeguard buildings against electrical obsolescence are detailed in this new 16-page bulletin M-58. Use with concrete topping and floor covering, fire resistance ratings, engineering data, dimensions and specifications, and load and property tables are given.
The R. C. Mahon Co.

489—Anti-Skid Grating

Safety Grip-Strut, an anti-skid grating in which the vertical members are joined by integral saddle to create lateral struts of great strength, is described in 12-page booklet. General applications, installation and assembly, and fastening devices are discussed. Load tables are given for both steel and aluminum grating.
The Globe Company.

490—Catalog of Buildings

All-new general line catalog 1671 for Butler buildings includes complete information on both all-metal and system buildings for commercial, industrial, and community use. Illustrates and describes rigid frame construction for both standard and low-pitch roofs, describes cover panels and construction features.
Butler Manufacturing Company.

491—Masonry Wall Reinforcement

Complete technical file on masonry wall reinforcement. Included is research data product features, cavity wall reinforcing, glass block reinforcing, illustrations, comparison guide, and specifications. Each subject division is tabbed for easy reference and the complete file is in a tabbed file folder for your cabinet file.
Dur-O-wal.

492—Aluminum Grating, Treads

New four-page folder describes Gary Super Galok aluminum grating and treads which can be used for decorative as well as for utility purposes and can be anodized in sunfast colors. Folder includes tables of safe loads, weights and symbols, panel widths. Specifications are also included.
Rockwell-Standard Corp., Grating Div.

493—Wire Rope Catalog

A complete basic catalog for selecting wire rope for any use. Cross sections of different types of rope show construction. Rope diameters, breaking strength, and weight are given for all classifications. Well illustrated showing different uses. Wire rope fittings are illustrated.
American Steel & Wire Division
U. S. Steel Corporation.

494—Steel Rope

This publication contains information required for selection and preparation of specifications for wire, strand, and rope used on guyed structures and suspended systems of all kinds, except major suspension bridges. Both standard and special fittings for use with bridge strand and bridge rope are illustrated.
John A. Roebling's Sons Corporation.

495—Gypsum Roof Decks

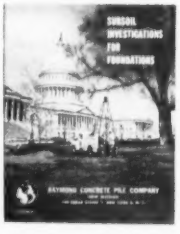
Technical bulletin 589 gives description of materials and methods, plus specifications used in the construction of poured gypsum roof decks. Contains tables for selecting steel framing members. Describes wide variety of formboards for conditions requiring insulation and acoustical treatments. Twelve pages.
National Gypsum Company.

496—Wire Reinforcement Study

New studies conducted by Armour Research Foundation agree with previous reports that the replacement of header courses by wire reinforcement *correctly designed* does not reduce the transverse strength of a wall. In fact there is an increase in strength of about 12 percent. Booklet contains illustrations of use.
AA Wire Products Company.

497—Precast Concrete Slabs

Bulletin X-541 gives complete information on Permacrete precast concrete crossing slabs. These edge-armored slabs provide smooth riding surfaces with greater safety and eliminate constant maintenance of railroad grade crossings. Widely used on crossings throughout industrial plant properties.
Permacrete Products Corporation.



498—Subsoil Tests for Foundations

Twelve-page booklet entitled "Subsoil Investigations for Foundations," catalog B-7, explains the reasons for making test borings to determine foundation requirements, what Gow test borings are, how they are made, and the results obtained. Illustrated are methods for making borings and taking soil samples.
Raymond Concrete Pile Co.

499—Data on Metal Grating

This 16-page, 2-color bulletin is a picture story of Kerrigan Iron Works. Shows how grating is fabricated into various forms and cutouts. Bulletin contains standard table of safe loads, engineering data, data on various types of anti-skid stair treads, and testing methods. Pictures grating types and stair treads.
Kerrigan Iron Works, Inc.

500—Floor Grating Applications

This new four-page folder features unusual uses for floor grating, including its use as sun shades for modern schools, and as low maintenance pressure-locked fencing that never needs painting. It shows dimensional diagrams of standard designs and gives safe load table for aluminum grating.
Borden Metal Products Company.

501—Industrial Floors

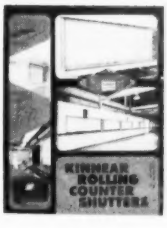
The revised edition of catalog 270 contains a complete description of Milcor Cellufloor and includes engineering data, load tables, construction details, and erection steps. Catalog also shows an economical blend system, electrification procedure, fireproofing methods, and includes specifications.
Inland Steel Products Company.

502—Rock Anchoring

The new Perfo system of rock anchoring is described in a 4-page folder. This system provides a fully grouted roof bolt and is effective in areas of soft rock. High shear resistance, long life, and simple installation are among the advantages detailed. The illustrations include drawings and photographs.
Sika Chemical Corp.

503—Nonshrinking Grout

Catalog 6423 describes a nonshrinking grouting and patching compound for use in grouting under machinery, for resurfacing concrete floors, for patching concrete floors, and for bonding concrete surfaces. It cushions vibration and prevents floor cracks.
A. C. Horn Companies,
Sun Chemical Corporation.



504—Rolling Counter Shutters

Bulletin 103 describes the Kinnear rolling counter shutters with midget slats. These metal shutters afford protection against weather, pilfering, or illegal entry. End photographs show construction of slats. Diagrams show dimensions for both crank and push-up operation. Includes specifications and special features.
The Kinnear Manufacturing Company.

505—Tower Cranes

Six-page, 3-color bulletin describes Peine slewing tower cranes. Profusely illustrated, this bulletin shows Peine tower cranes in various situations. One picture shows operation on a 320-ft. high building. Safety and stability are stressed, as well as maneuverability and ease of installation.
Beatty Scaffold, Inc.

506—Flooring and Grating

This 20-page bulletin describes the wide line of Hendrick's Mitco open steel flooring, aluminum grating, Shur-Site treads, Armogrids, and driveway grating. Fully illustrated with actual installations in a wide range and variety of industries. Complete with sizes, specifications, capacities, applications, safe loading data.
Hendrick Manufacturing Co.

507—Integral Door and Frame Units

Completely redesigned and sectionalized 24-page catalog, bulletin 2459, has new indexing and ready-reference pages. Four door models are featured. Mortise and cylindrical locks plus other hardware and accessories are illustrated. The solid mineral core, a unique construction feature, is also described.
Dusing & Hunt, Inc.

To order personal copies of these bulletins, please fill out the card between pages 2 and 3 or 42 and 43.

508—Steel Curtain Wall

Booklet 57791, entitled "Walls of Steel," fully discusses the selection, fabrication, and erection of steel curtain wall for many recent commercial and industrial buildings. The book is illustrated in full color and describes the use of steel panels as spandrels, column covers, and mullions. Practical and economical.
U. S. Steel Corporation.

509—Machine Braided Slings, Fittings

Tuffy Sling Handbook, SL-NO-3, a 40-page reference manual, covers more than 80 subjects on Tuffy machine braided slings and sling fittings. Contains reference charts on sling types, dimensions, and rated loads in addition to charts on fittings for quick reference on sizes, rated loads, weights, and features.
Union Wire Rope Corporation.

510—Machinery Grout

New machinery grout five times stronger than concrete offers unique combination of oil and chemical resistance, excellent bond to metal, high compressive and tensile strength. It is fast-hardening and nonsettling. No. 648 Grout is especially recommended for permanently seating machinery subjected to severe conditions.
The Ceilcote Company, Inc.

511—Rigid Frame Buildings

New 20-page booklet describes Stran-Steel Corporation's complete line of rigid frame buildings with the luxury look of Stran Satin for industrial and commercial use. Building features, construction details, and dimensions are clearly shown. For manufacturing and processing plants, warehousing, and retail operations.
Stran-Steel Corporation.

512—"T-1" Steel Data

Booklet 607-56 describes USS "T-1" steel, one of the most important members of the alloy family to appear on the scene in years. Contains cost comparisons, complete engineering data, metallurgical characteristics, fabrication practices, and applications. Profusely illustrated to show uses. Cuts costs, increases performance.
U. S. Steel Corporation.

513—Open Metal Decking

Irving decking catalog F-300 contains illustrations, descriptions, and engineering data on open metal grid bridge roadways, with many of the advantages inherent in this type of bridge roadway, such as light weight, cleanliness, drainage, safety, durability, strength, traction, and economy.
Irving Subway Grating Company, Inc.

514—Lightweight Aggregate Concrete

A new publication, MBR-P-14, presents histories of 13 outstanding projects where lightweight aggregate concrete provided decided advantages and economies. Job stories illustrate how Pozzolith helped achieve high quality lightweight concrete. Discussion covers use of lightweight aggregate concrete as a structural material.
The Master Builders Company.

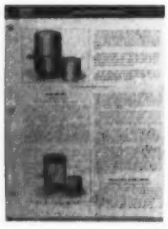
515—Floor Products

This 4-page bulletin in tabular form lists metallic, nonmetallic, asphalt, latex, epoxy, and synthetic floor products for hardening, resurfacing, patching, and coating new and old concrete and wood floors. Covers the types of surfaces, resistant factors, and coverage.
A. C. Horn Companies,
Sun Chemical Corporation.

516—Steel Sheet Piling

Booklet 17954-56 describes the uses, characteristics, and assembly of USS steel sheet piling sections. Complete tables of wall dimensions, cellular structures, accessories, and weights. Included are diagrams of single sections, walls, corners, cellular structures, cofferdams, bulkheads and piers, and caps and copings.
U. S. Steel Corporation.

WATER TREATMENT AND WASTE DISPOSAL

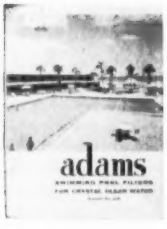


517—Water Softeners

Technical bulletin on zeolite water softeners of conventional and "double-check" type in manual and automatic models. Explains how "double-check" type gives up to 44% greater soft water output. All types of ion exchange zeolites covered. Water softener selection chart is included. Bulletin is illustrated.
Elgin Softener Corporation.

518—Liquid Separators

Bulletin WC-121 describes the Graver Hi-Sep dialyzer. The separation and recovery of acid, alkali, and salt liquors, which until now has been limited to laboratories and one or two industrial applications, now is possible for general use. Includes design features, operation, applications, detailed drawings.
Graver Water Conditioning Co.



519—Swimming Pool Filters

New 24-page technical bulletin for architects and consulting engineers on swimming pool filters for municipal, public, and institutional pools. Contains typical installations, cross-section and operational drawings, charts, and factual comparison. This manufacturer does not offer a filter for backyard type pools.
R. P. Adams Company, Inc.

520—Rubber Gaskets

"Tylox Rubber Gaskets," 20-page brochure in color, fully describes Hamilton Kent's compression-type rubber sewer and drain pipe couplings for tongue-and-groove pipe. Contains full information on how to apply gaskets to pipe and install pipe into the line; also engineering data and specification suggestions.
Hamilton Kent Manufacturing Company.

521—Water Treatment Equipment

Bulletin E describes the automation of ion-exchange and water treatment equipment. A suggested specification is included, together with typical illustrations and descriptions of important design features. Automatic control systems described are adaptable to any automatic valve sequencing operation.
Illinois Water Treatment Company.

522—Water Supply

Ranney's revised 24-page booklet entitled "Supplying Water" describes the unique Ranney methods of supplying more clear water to industry and municipalities. Valuable information is included on horizontal collectors, Vertube wells, Ranney intakes, and Ranney's new dewatering process.
Ranney Method Water Supplies, Inc.

523—Irrigation Gates

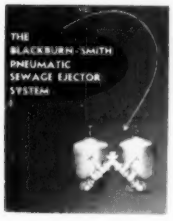
Manual P. O. 10558 is a 32-page booklet describing four basic types of Armco irrigation gates – slide, flap, radial, and roller for various uses in controlling water. Drawings indicate over-all dimensions, keyed to tables for all models. Also included in the manual are tables and specifications.
Armco Drainage & Metal Products, Inc.

524—Water, Sewage, Waste Treatment

Bulletin B-I-F-6 describes the most complete equipment line offered for treating water, sewage, or wastes. Twenty-four pages of product illustrations and descriptions cover – dry, liquid, and gas feeders; flow, level, pressure, temperature meters, and instruments; controls, systems, and allied equipment.
B-I-F Industries, Inc.

525—Sodium Zeolite Softeners

Publication 5420E is a new bulletin on Cochrane sodium zeolite softeners featuring the new-design hydromatic valve which permits removal of the valve front for access to valves and seats. Bulletin also describes the simplified piping system for both automatic and manual control; tells how to determine size required.
The Cochrane Corporation.



526—Pneumatic Sewage Ejector

Municipal pump and lift stations will give uninterrupted service when equipped with B-S pneumatic sewage ejectors. Available in capacities of 30 to 500 gpm for discharge heads up to 150 ft, these single and twin units eliminate complex piping, screens, shredders, and impellers. Catalog S-55 fully describes them.
Condenser Service & Engrg. Co., Inc.

527—Waste and Drainage Systems

Literature illustrates "Vulcathene" waste and drainage systems. Line drawings, dimensions, and prices for a wide range of fittings. "Vulcathene" has high impact strength, excellent resistance to corrosion and thermal shock. "Vulcathene" moldings are strain free, inexpensive.
American Vulcathene Div.,
The Nalge Co., Inc.

528—Water, Sewage, Waste Treatment

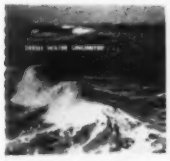
Catalog 952 describes sections on water and bar screens, grinders, collectors, settling tanks, scum removers, Floctrols (controlled flocculation), feeders, conveyors, bucket elevators, chains and sprockets for water, sewage, and industrial waste treatment. Drawings, charts, and illustrations are included.
The Jeffrey Manufacturing Co.

529—High-Flow-Rate Clarifier

Bulletin CL-158 describes the Illco-Way continuous high-flow-rate clarifier, an upflow coagulator design that is adaptable to a wide variety of water and waste treatment applications, including lime-soda dealkalization, removal of iron, color, turbidity, organics, silica, and chemical waste treatment.
Illinois Water Treatment Company.

530—Tray Deaerating Heaters

Bulletin WC-106A describes new and larger tray deaerating heaters. Dependable and efficient for utilities, institutions, and industrial power plants. Each is specifically tailored to fit the power cycle, heat balance, and operating conditions of the individual plant. Included are cutaway drawings and installations.
Graver Water Conditioning Co.



531—Evaporators

A 24-page booklet describes Maxim evaporators: steam, heat recovery, flash, steam jet compression, and vapor compression. Tells about Maxim's marine test station for pre-testing and R & D under marine conditions. Describes typical power-water plant, high purity make-up feed water, gives engineering data.
Emhart Mfg. Co., Maxim Division.

532—Chlorinators

This 16-page pocket size booklet describes Wallace & Tierman's new V-notch chlorinators. It explains what they are, how they work, and the type of automatic control possible with this chlorinator. The booklet also shows the full line of chlorinators and lists chlorinator capacities. Major features illustrated.
Wallace & Tierman Incorporated.

To order personal copies of these bulletins, please fill out the card between pages 2 and 3 or 42 and 43.

533—Supplying Water

Twenty-four page booklet entitled "Supplying Water" describes the unique Ranney methods of supplying more clear water to industry and municipalities. Valuable information is included on horizontal collectors, infiltration galleries, Vertube wells, Ranney intakes, and new dewatering process.
Ranney Method Water Supplies, Inc.

534—Bell and Spigot Pipe Joints

"Rexon K" rubber sewer pipe gaskets are fully described in a 4-page bulletin in color. Joints are self-energizing compression-type for coupling bell and spigot concrete pipe. Includes full details on applying gaskets and installing pipe in the line. Successive steps of application and installation are illustrated.
Hamilton Kent Manufacturing Company.

535—Ion Exchange

Technical bulletin explains principles and chemical reactions of ion exchange in simple, understandable terms. Describes and shows flow-diagrams of eight typical multi-column deionizers. Gives details about mixed-bed type Ultra-Deionizer giving water of highest chemical purity. Deionizer selection chart.
Elgin Softener Corporation.

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